

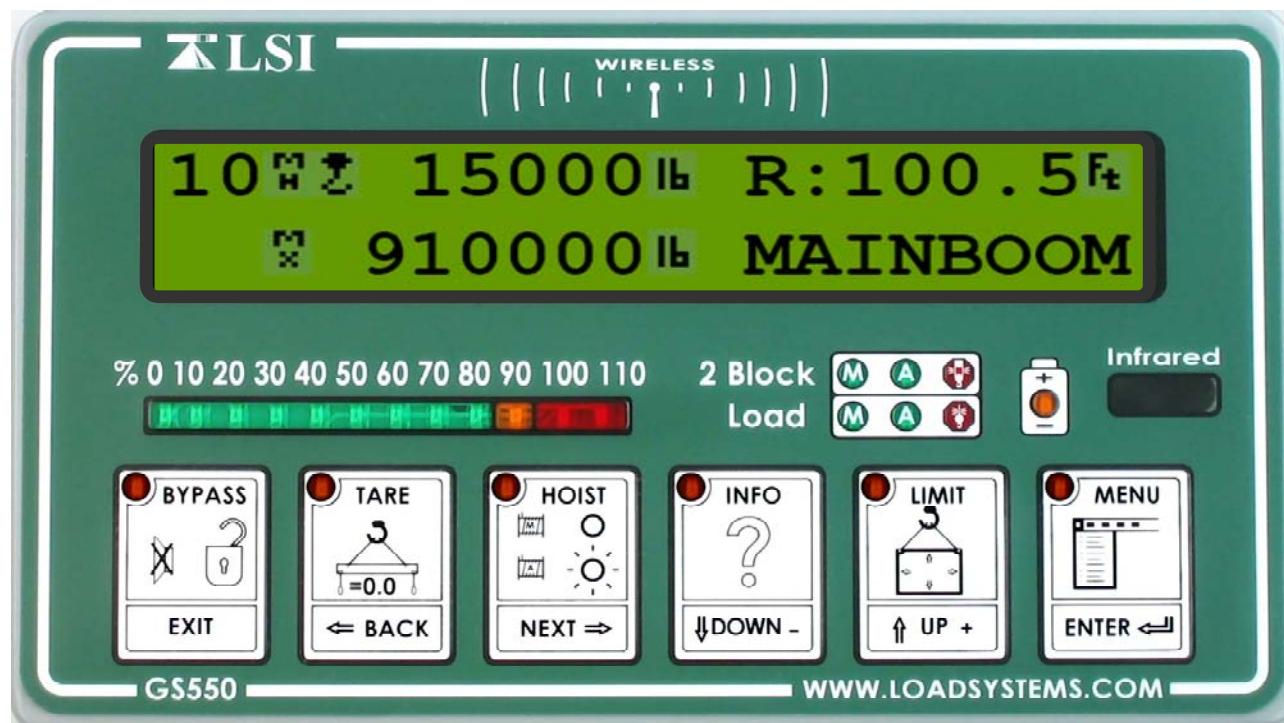


Load Systems International

User Manual

The GS550 System

Document Part Number GM550, Version 2004, Revision B



Engineered weighing solutions for crane and lifting application

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Introduction

Overview

The GS550 system includes the cabin mounted GS550 radio display and compatible crane mounted sensors. The GS550 creates a two-way radio network with the sensors to bring required lift data to the operator. Hoist load, boom and jib angles, boom length, wind speed and pending two-block can be detected and indicated to the operator in real time. Working load radius can be calculated and compared to a rated capacity chart (if programmed). Furthermore the GS550 can be programmed to generate warnings, alarms and lockout commands, all triggered by adjustable thresholds and limits. All these events can be recorded by the data logger with a time and date stamp. The exact operational function of the GS550 system depends on the sensor configuration used and the rated capacity charts programmed (where applicable). The GS550 includes an infrared port to facilitate software and chart updates and data logger downloads using a compatible personal digital assistant (PDA) or cell phone. Compatible sensors include the GS050 anti-two-block, the GC series load cells and GS001 series line rider and load pin transmitters, the GS010 angle sensors, the GS011 angle sensor and length transmitter and the GS020 wind speed sensor. The GS550 system is designed as an operator aide and is in no way a substitute for safe operating practice

Version Compatibility

GS series product with version 2 firmware is not compatible with GS series product with version 1 firmware. For information on upgrading GS series product from version 1 to version 2 firmwares please contact LSI.

Start-Up

The GS550 must be correctly programmed for the system sensors installed. The GS550 powers up with several green lights flashing, this indicates that the display is waking up programmed sensors and creating a radio communication link with each. Once a reliable radio communication network is established, all green lights will remain lit without flashing.

This process may take up to one minute. The delay is created by the battery management function and does not affect system security. If an anti-two-block switch detects a pending two-block event, if a load cell detects a change in load, or if an angle sensor detects a change in angle, the appropriate radio link will be established in less than 0.1 seconds. To immediately wake-up a load cell, lift the hook with a load; to immediately wake up an angle sensor, change the boom angle.

In special conditions of lockout created by a missing sensor, you may bypass that sensor until the next display power up by pressing bypass for 10 seconds. That sensor green light should stop flashing and then turn off.

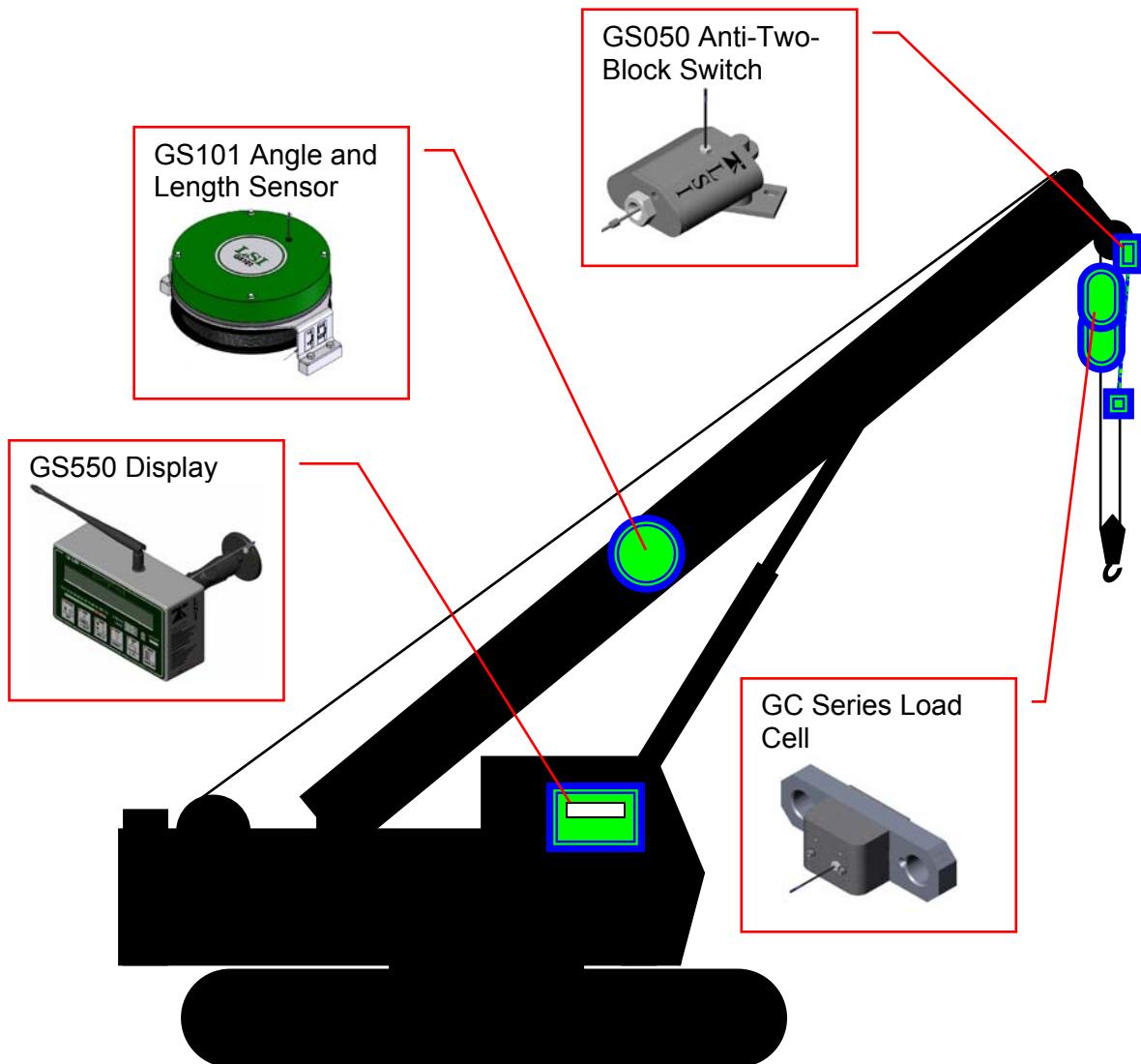


Figure: Key components in a typical system

Operation

Display GS550

The GS550 displays detailed information on the backlit, two lines liquid crystal display (LCD). Additional information including warnings, alarms, and radio status is communicated by the display lights and the display buzzer.

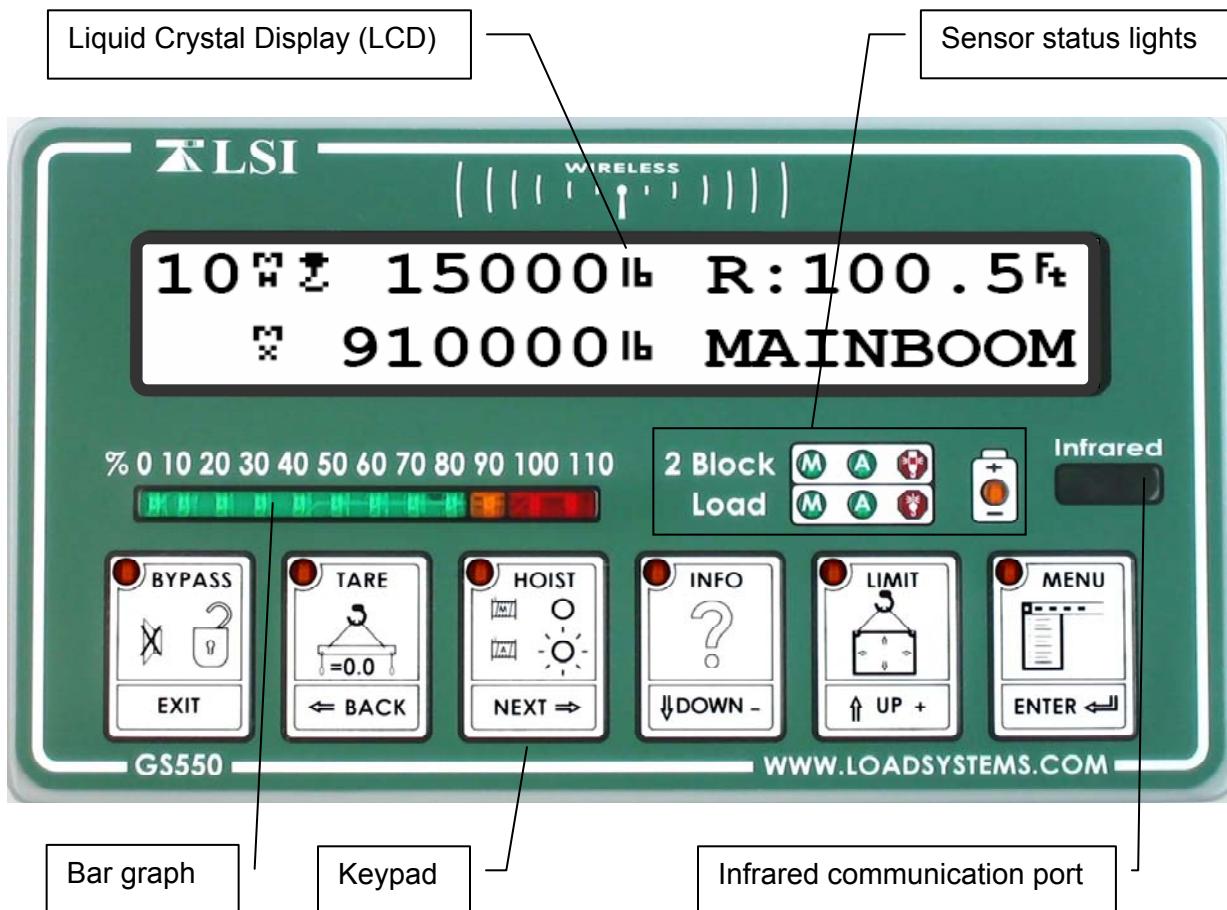


Figure: GS550 front view

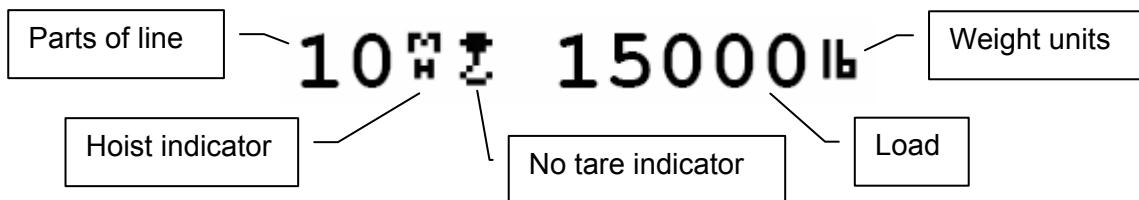


Figure: GS550 load display

Liquid Crystal Display

Detailed lift data and system information is displayed here. The liquid crystal display (LCD) can be adjusted to facilitate viewing in varied lighting conditions. See the Display Settings section of this manual.

Sensor Status Lights

Detailed lift data and system information is displayed here. The liquid crystal display (LCD) can be adjusted to facilitate viewing in varied lighting conditions.

2 Block. The red 2 Block alarm light comes on when a programmed anti-two-block switch is in alarm.

The green “M” (main) and “A” (auxiliary) anti-two-block radio status lights stay on when the GS550 has a reliable radio communication link to all programmed anti-two-block sensors. The radio status lights flash green when communication is intermittent or absent. The M refers to the first anti-two-block sensor programmed in the sensor list. The A refers to all other anti-two-block sensors programmed in the sensor list.

Load. The red Load alarm light comes on when a load sensor is in overload.

The green “M” (main) and “A” (auxiliary) load radio status green lights stay on when the GS550 has a reliable radio communication link to all programmed sensors. The radio status lights flash green when communication is intermittent or absent. The M refers to the first sensor programmed in the sensor list except anti-two-block. The A refers to all other sensors programmed in the sensor list except anti-two-block.

Low Battery. The amber light of the battery icon comes on when battery life for a sensor programmed in the sensor list drops below 10%. Normally several weeks of battery life remains from the moment the low battery light first comes on.

Bar Graph. The bar graph displays the gross load lifted by a load sensor as a proportion of the maximum load allowed, expressed in 10% increments. Maximum load is the lowest of the operator set maximum load limit and the working load limit (WLL) as calculated from the rated capacity charts*. When there are two or more load sensors programmed in the sensor list the bar graph will indicate the load for the sensor closest to its maximum allowable.

Infrared Port

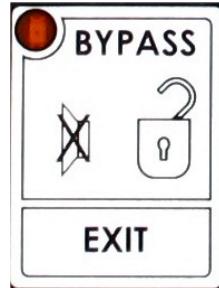
The infrared port is used to download data from the data logger or to upload firmware updates and capacity charts using a GT103 portable download tool or other compatible device.

Keypad

The keypad consists of six buttons used to control, consult, program, and troubleshoot the GS550 display and system. Each button has two functions; a primary function for the operation display, and a secondary function for menu navigation and programming. The secondary functions are described in the Menu Navigation sub-section of this manual. The primary functions are described below.

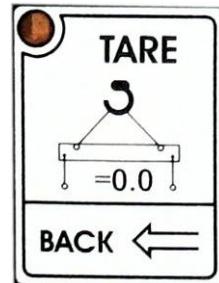
* WLL is indicated by rated capacity indicators only.

Bypass. Press **Bypass** to override lockout for emergency purposes*. The alarm will remain silent until the next alarm; lockout will re-engage as soon as the button is released.



Tare. Zero the hook and rigging weight.

1. Press **Tare** to enter the tare menu.
2. Use **Next** to select the load sensor.
3. If no tare value, then press **Tare** to create a tare value equal to the weight on the load sensor. Example: with hook block and rigging only. Load display is net weight (gross weight minus tare value).
4. To remove tare value, press **Tare**.
5. Press **Exit** to return to the operation display.

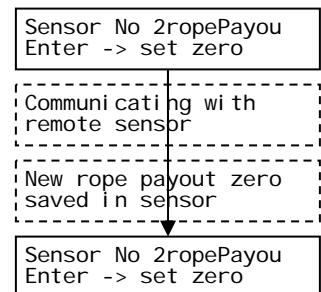


Tare and Load Indication

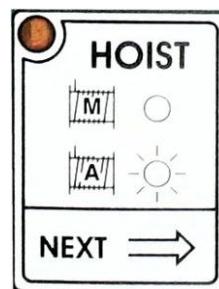
	LCD Indicator	Tare Light	LCD Load Value	Bar Graph
No tare value		Off	Gross weight	Gross weight
Tare value		On	Net weight	Gross weight

Tare. Zero rope payout (length).

- Press **Tare** to enter the tare menu.
- Use **Next** to advance to the rope payout sensor.
- Press **Enter** to zero rope payout length. The new zero will be saved by the rope payout sensor.
- Press **Exit** to return to the operation display.



Hoist. Press **Hoist** to change the operating display page. The exact order and content of operation display pages depends on system sensor and capacity chart configuration. Systems with more than one load sensor typically display main hoist load information on the first page and auxiliary hoist load information on the second page.



* This applies only if the GS550 has been correctly installed to control crane lockout function.

Info. When the orange **Info** light flashes press **Info** to see critical system alerts. Press **Next** to advance from one page to the next.

Standard info menu pages include:

- BIOS (Binary Input Output System) number and version
- Firmware number and version
- Chart number and version (if available)
- SPKG (Software Package) number

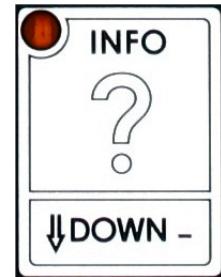


Table: Information Menu Alerts

<u>Alert</u>	<u>Description</u>
Load id: G15000 Sensor maximum limit	<p>The sensor indicates a value greater than the operator adjusted limit</p> <p><i>WARNING! Do not operate the crane beyond the limits specified by the manufacturer.</i></p> <ul style="list-style-type: none"> • Verify operator adjusted limits in the limit menu.
Load id: G15000 Sensor minimum limit	<p>The sensor indicates a value less than the operator adjusted limit</p> <p><i>WARNING! Do not operate the crane beyond the limits specified by the manufacturer.</i></p> <ul style="list-style-type: none"> • Verify operator adjusted limits in the limit menu.
Load id: G15000 Sensor low battery	<p>Less than 10% of battery life remains in the sensor.</p> <ul style="list-style-type: none"> • Schedule battery replacement for the next available opportunity. Typically several weeks of operation remain from the moment the sensor low battery warning is first triggered.
Load id: G15000 No communication	<p>The display isn't receiving communication from the sensor.</p> <ul style="list-style-type: none"> • Verify that the sensor id number programmed matches the id number of the sensor installed on the crane. Go to menu 5A1.
Verify white wire (unexpected voltage)	<p>Voltage is detected on the lockout wire when in alarm[*]. With the standard relay configuration voltage should not be present on a lockout wire in alarm condition.</p> <ul style="list-style-type: none"> • Verify the wire connection. Refer to the Power Supply and Lockout Connection sub section of this manual.
Verify white wire (shorted to ground)	<p>Voltage is not detected on the lockout wire when safe[†]. With the standard relay configuration voltage should be present on a lockout wire in safe condition.</p> <ul style="list-style-type: none"> • Verify the wire is not shorted to ground. • Verify the wire is not connected directly to the valve coils; a relay should be installed between the wire and the valve coils. Refer to the Power Supply and Lockout Connection sub section of this manual.
Main Out of chart	<p>One or more primary conditions of the chart selected for the hoist is not met (example: telescopic boom length).</p> <ul style="list-style-type: none"> • Verify the conditions of the selected rated capacity chart.
Main angle above chart maximum	<p>The boom or jib angle is above the maximum angle permitted by the selected chart. (For charts determined by radius only this message will occur when the radius is less than the minimum radius permitted by the chart).</p> <ul style="list-style-type: none"> • Verify the boom and jib angles permitted by the rated capacity chart selected.

^{*} If the lockout relay is inverted this alert will occur when voltage is detected on the wire when safe.

[†] If the lockout relay is inverted this alert will occur when voltage is not detected on the wire in alarm.

<u>Alert</u>	<u>Description</u>
Main angle below chart minimum	<p>The boom or jib angle is under the minimum angle permitted by the selected chart. (For charts determined by radius only this message will occur when the radius is greater than the maximum radius permitted by the chart).</p> <ul style="list-style-type: none"> Verify the boom and jib angles permitted by the rated capacity chart selected.

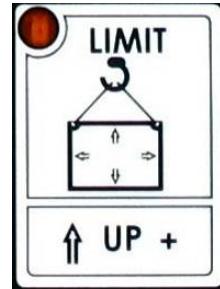
Limit. Set hoist limits.

Press **Limit** to access the limit menu. The limit menu displays the limits for each sensor in the sensor list on successive pages.

Use **Next** to scroll from one limit to the next.

Use **Up** and **Down** to adjust a limit.

When using the GS550 as a load indicator without programmed crane specific rated capacity charts the load limit is typically set to the lesser of the rope limit, the hoist limit, and the maximum allowed capacity as determined from the capacity charts.



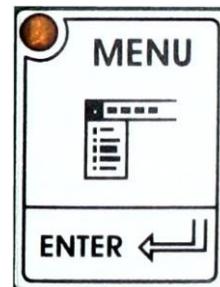
When using the GS550 as a rated capacity indicator with programmed crane specific rated capacity charts the load limit is typically set to the lesser of the rope limit and the hoist limit.

Tip: Press Up and Down simultaneously to return a limit to the factory default setting. The factory default maximum limit for load sensors is 10 000 lb per part of line.

Tip: When the weight units are tons the minimum load limit increment is 0.1 ton per part of line.

Menu. Press **Menu** to access the five basic system menus:

- 1) Parts of Lines
- 2) Crane Rigging
- 3) Display Settings
- 4) Installation
- 5) System Diagnostic



Menu System

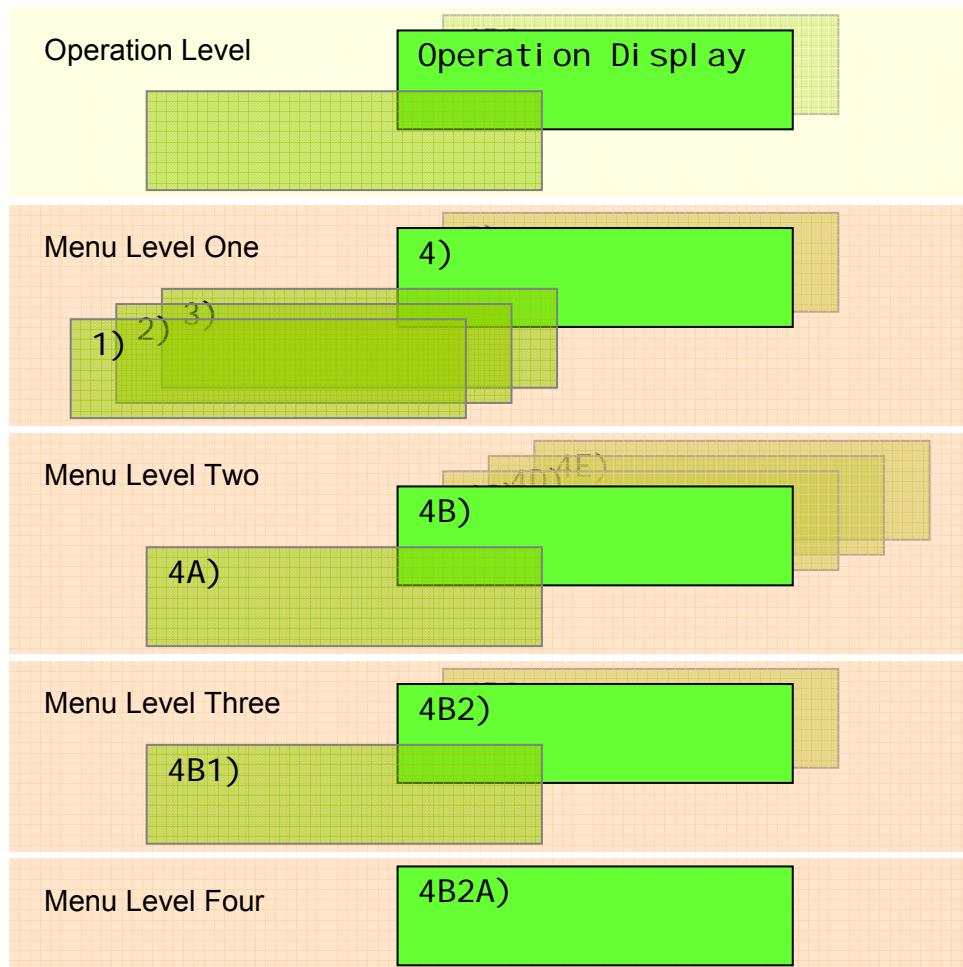
There are five basic menus (level one) used to program, consult and control the GS550 system.

- 1) Parts of Lines
- 2) Crane Rigging
- 3) Display Settings
- 4) Installation
- 5) System Diagnostic

The basic menus include nested sub-menus (level two, three and four) designed to address specific tasks including adjusting values, choosing from lists and following "wizards" through step by step processes.

Menu Numbers

Menus are identified by a number in the upper left corner. The basic menus (level one) are numbered one through five. Level two menus are lettered alphabetically. Level three menus are numbered. Level four menus are alphabetized.



Menu Navigation

From the operation display press **Menu** to see the five basic menus (level one). Press **Enter** to drill down one level and enter a selected menu. Press **Exit** to leave a menu and return up one level. Press **Next** to move to the next page within a menu; press **Back** to move to the previous page within a menu. Use **Up** and **Down** to modify numeric values and to move through a list of choices.

*Tip: most menus are circular; press **Next** on the last page of a menu to return to the first page.*

*Tip: most lists are circular; press **Down** on the last entry of a list to return to the first entry.*

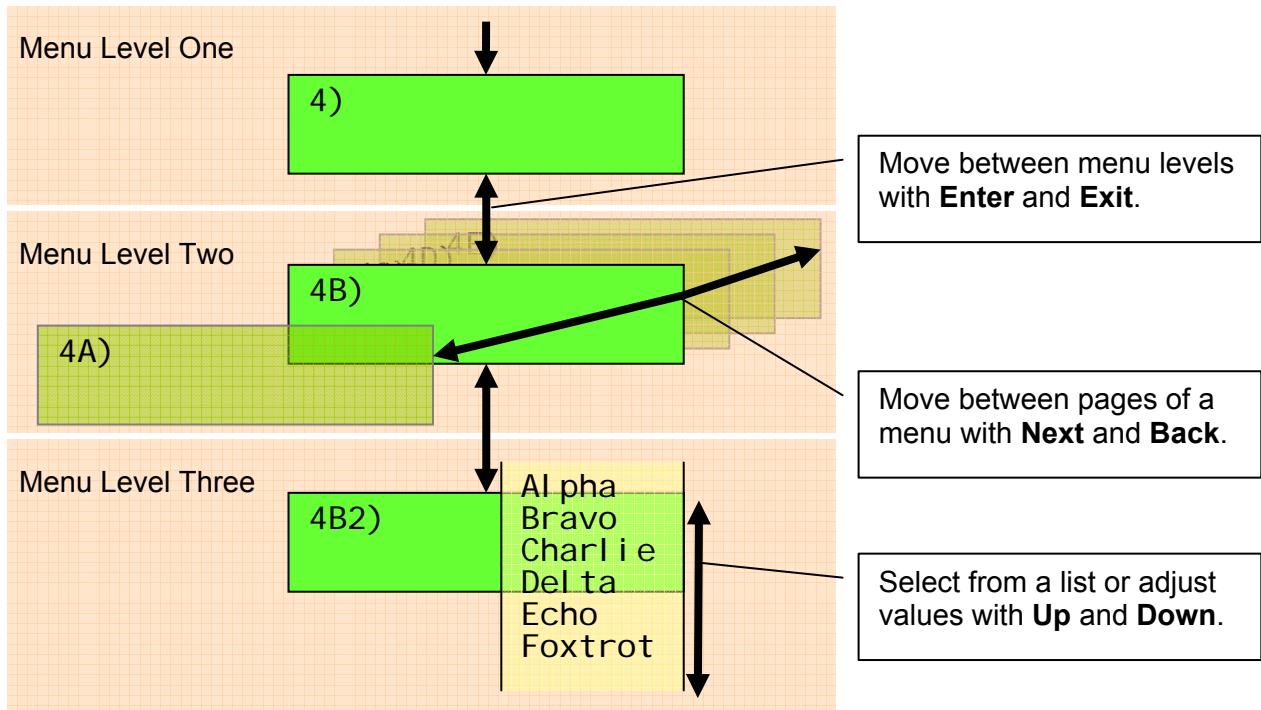


Figure: Menu Navigation

Password Protection

The submenus of menu 4) Installation are protected by a password by default. Password settings can be adjusted in menu 4H) Password Settings. The factory set administrator and user passwords are AZA. If the user password is forgotten, it can be changed as long as the administrator password is known.

Forgotten password? Call LSI technical support (Houston, TX) at 888 819 4355 or contact your local LSI representative.

Menu Layout

The figure below shows the menus accessible to the operator without password protection under the default factory settings.

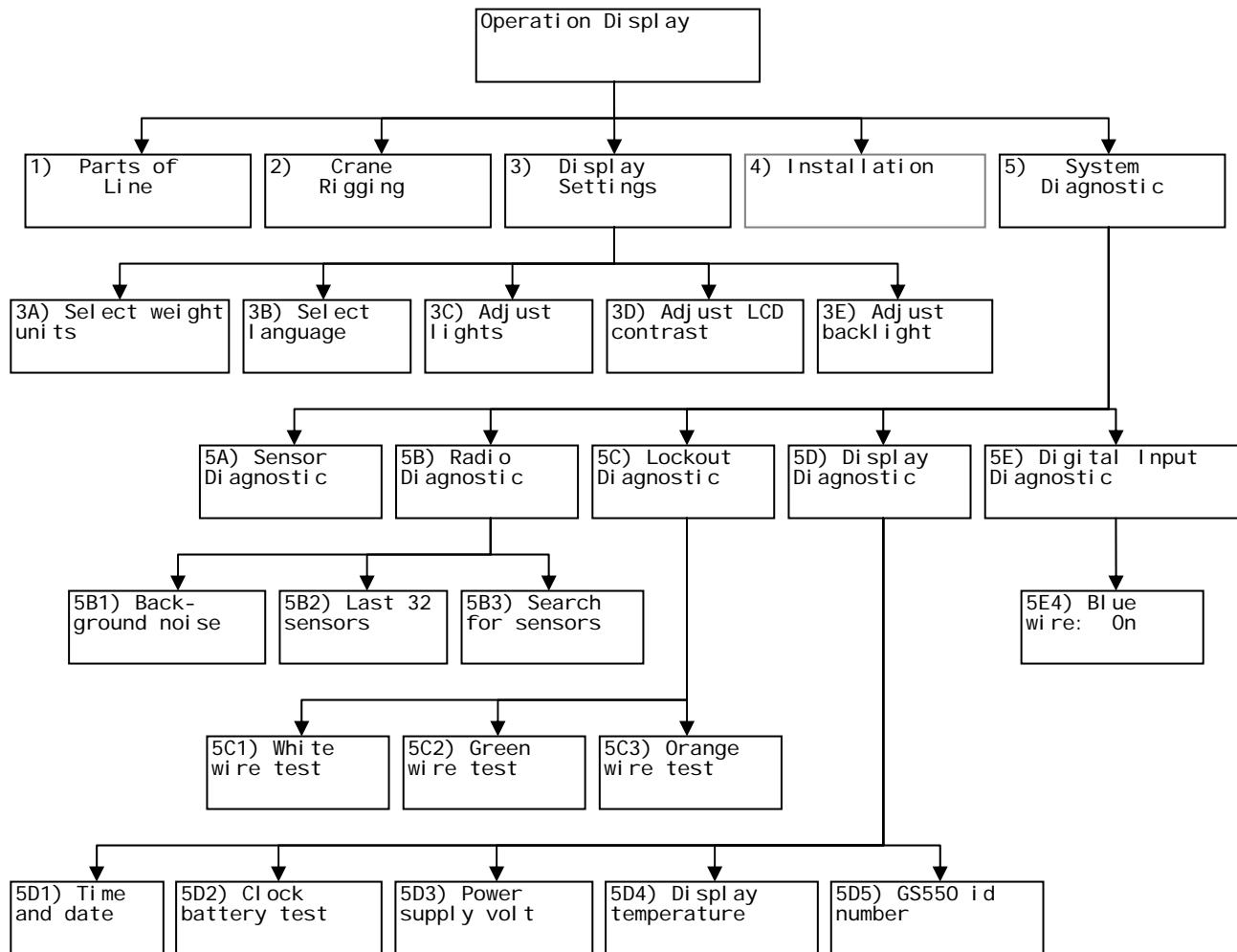


Figure: Open access menus – default factory settings

Parts of Line

The load sensor often shares the weight with multiple parts of line. For accurate load indication the GS550 must be programmed for the number of parts of line.

1. Press **Menu** → **Enter** to enter menu 1) Parts of Line.
2. Use **Next** and **Back** to select the load sensor; typically sensor number one is associated with sheave one (the main hoist) and sensor number two is associated with sheave two (the auxiliary hoist) etc.
3. Use **Up** and **Down** to adjust the number of parts of line.
4. Press **Enter** to save any changes and then press **Exit** twice to return to the operation display.

Rated Capacity Indicators

The GS550 can be programmed to assist the operator by indicating the working load limit (WLL) from the crane specific rated capacity charts according to the angle and radius information received from the boom mounted sensors.

Display Programming

In order to indicate WLL the GS550 must be programmed with a valid rated capacity chart specific to the crane. The capacity chart programmed can be verified on the chart number page of the Information menu: press **Info** → **Next** → **Next** (press **Exit** to return to the operation display). If the chart number information screen says “Chart not loaded” the GS550 has not been programmed to function as a rated capacity indicator. If rated capacity indication is required contact the person responsible for the GS550 system installation and maintenance. *If in doubt, contact LSI.*

Crane Rigging

Under no circumstances is the GS550 a substitute for safe operating practices. The operator must fully understand the crane rigging and the crane rated capacity chart to be able to correctly program the GS550 for rated capacity indication. The GS550 will not take into account critical variables such as weather, ground and crane conditions that will reduce the safe working capacity of the crane.

Chart Wizard

Rated capacity indication is based on interpretation of a selected capacity chart using boom angle and load radius. The chart must be selected by “rigging” the working hoist in the GS550; this is done by following the chart wizard in menu 2) Crane Rigging.

Important! It is possible to leave the chart wizard at any time by pressing Bypass; the GS550 will display the message “Rigging ABORTED”. Current capacity chart selection may have changed, possibly changing the rated capacity indicated by the GS550. Always complete the chart wizard all the way to the “Rigging ok” message before operating the crane.

1. Press **Menu** → **Next** → **Enter** to start the chart wizard.
2. The first page of the chart wizard is generally “select hoist”. Use **Up** and **Down** to select the hoist. If there is only one load sensor in the system select “main”. With two or more load sensors in the system the main hoist is associated with the first load sensor in the sensor list; the auxiliary hoist is associated with the second sensor in the sensor list etc.
3. Press **Next** to advance to the next step of the chart wizard.
4. The steps that follow will depend on the size and complexity of the rated capacity chart itself. Typical steps include chart selection, outrigger / on rubber selection and boom length selection (lattice cranes only). Use **Up** and **Down** to select from the list of choices and then press **Next** to advance to the next step. For accurate rated capacity indication the rigging configuration selected in the chart wizard must reflect the actual rigging of the working sheave.
5. After the last step has been completed the GS550 will display “Rigging ok” and then it will return to the operation display. If a sensor required by the selected capacity chart is not a part of the system or has not established communication with the GS550, then the GS550 will display “sensor invalid”.

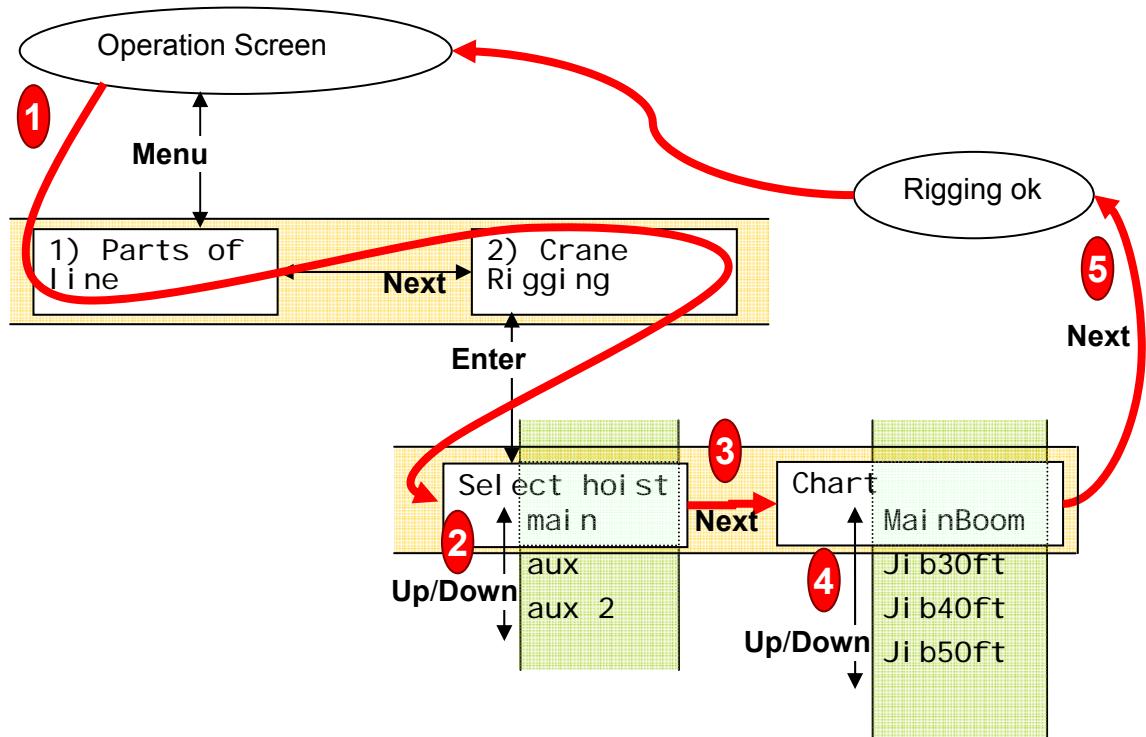


Figure: The chart wizard – follow steps 1 through 5 to select the capacity chart

Display Settings

Program the display for operator preferences in menu 3) Display Settings.

Weight Units

Important! The steps of boom length, load radius, and rated capacity may differ on rated capacity charts prepared in different units for the same crane.

The weight units for load display may be selected according to operator preference. Length units are associated with weight units by default; see the table below.

1. Press **Menu** → **Next** → **Next** → **Enter** to go to menu 3A) Weight units.
2. Use **Up** and **Down** to select the weight units for load display.
3. Press **Next** to advance to the language adjustment page or press **Exit** twice to return to the operation display.

Table: Weight Units

Unit	Notes	Equivalent Weight		Length Unit
Pound (lb)		1 lb	0.4536 kg	Foot (ft.)
Kilogram (kg)		2.205 lb	1 kg	Metre (m)
Short ton (T)	United States	2000 lb	907.2 kg	Foot (ft.)
Long ton (T)	United Kingdom	2240 lb	1016 kg	Foot (ft.)
Tonne (t)	International System (SI)	2205 lb	1000 kg	Metre (m)

Language

Future versions of the GS550 will include different display language options.

1. Press **Menu** → **Next** → **Next** → **Enter** → **Next** → **Next** to go to menu 3B) Display language.
2. Press **Next** to advance to the contrast adjustment page or press **Exit** twice to return to the operation display.

Light Intensity

Adjust the intensity off the LEDs (light emitting diodes) to facilitate viewing in bright sunlight or in reduced visibility.

1. Press **Menu** → **Next** → **Next** → **Enter** → **Next** → **Next** to go to menu 3C) Light intensity adjustment.
2. Use **Up** and **Down** to adjust the intensity of the lights.
3. Press **Next** to advance to the contrast adjustment page or press **Exit** twice to return to the operation display.

Contrast

Adjust the LCD contrast to optimize visibility.

1. Press **Menu** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next** to go to menu 3D) LCD contrast adjustment.
2. Use **Up** and **Down** to adjust the display contrast.
3. Press **Next** to advance to the backlight adjustment page or press **Exit** twice to return to the operation display.

Backlight Mode

Adjust the LCD backlight control mode to conform to viewing and power supply conditions.

1. Press **Menu** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next** → **Next** to go to menu 3E) Backlight mode.
2. Use **Up** and **Down** to select the backlight control mode. The LCD backlight can be always on, always off or on a four second timer. In the four second timer mode the backlight will come on for four seconds when any button is pressed.
3. Press **Next** to advance to the backlight adjustment page or press **Exit** twice to return to the operation display.

System Diagnostic

Diagnose system failures with the sub menus of menu 5) System Diagnostic.

System Sensors Diagnostic

1. Press **Menu** → **Back** → **Enter** → **Enter** to go to menu 5A1).
2. Use **Back** and **Next** to select the sensor.
3. Press **Enter** to see sensor data.

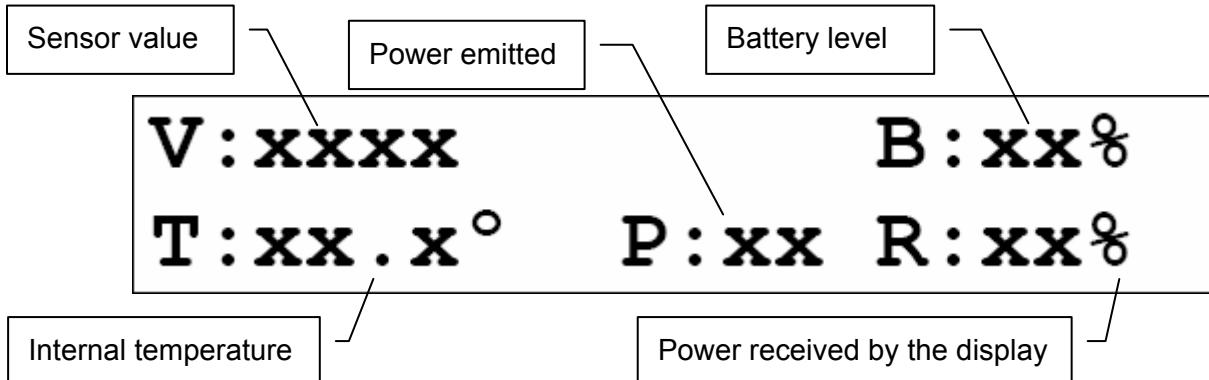


Figure: Sensor diagnostic data

4. Press **Enter** to get the sensor firmware product and version numbers.

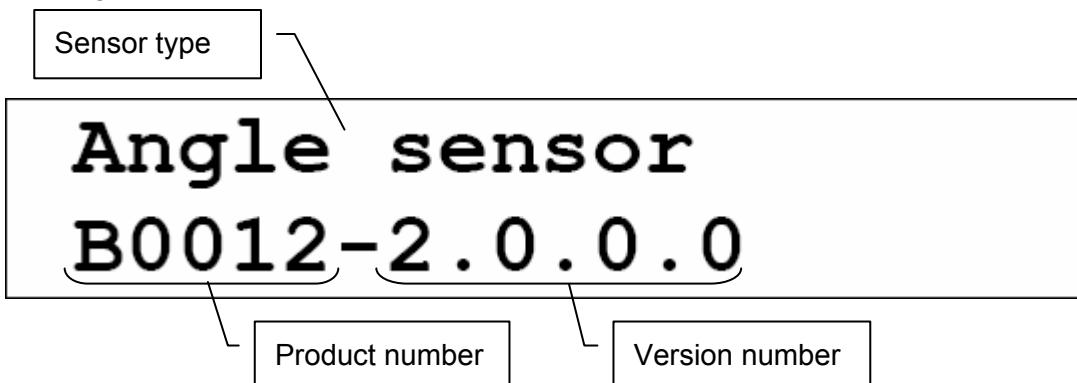


Figure: Sensor firmware product and version numbers

5. Press **Exit** five times to return to the operation display.

Radio Network Diagnostic

1. Press **Menu** → **Back** → **Enter** → **Next** → **Enter** to go to menu 5B1) Radio network background noise.

WARNING! The "list of last 32 sensors received" includes all functioning GS series sensors within range. Programming a GS550 display for sensors from a different system will disable that system and render indication by both systems inaccurate.

2. Press **Next** to go to menu 5B2) List last 32 sensors received.
 - a. Press **Enter** to access 5B21), the list of the last 32 sensors received. Sensors are shown with their radio id number and the sensor type.
 - b. Use **Up** and **Down** to scroll through the list.
 - c. Press **Exit** to return to menu 5B2)
3. Press **Next** to go to menu 5B3) Search for sensors.
 - a. Press **Enter** to launch a sensor search. After searching, the display automatically reverts to 5B21), the list of the last 32 sensors received (see step 2.a).
4. Press **Next** to go to menu 5B4) Bit error rate communication test. This test should only be conducted by LSI technical service personnel.
5. Press **Exit** three times to return to the operation display.

Lockout Diagnostic

1. Press **Menu** → **Back** → **Enter** → **Next** → **Next** → **Enter** to go to menu 5C1) White wire... The page shows the lockout condition of the output (alarm or safe) and the self-test (pass or fail). To temporarily invert the lockout relay press **Up** or **Down**.
2. Press **Next** to go to menu 5C2) Green wire diagnostic.
3. Press **Next** to go to menu 5C3) Orange wire diagnostic.
4. Press **Exit** three times to return to the operation display.

Display Diagnostic

1. Press **Menu** → **Back** → **Enter** → **Next** → **Next** → **Next** → **Enter** to go to menu 5D1) Time and Date. The page shows the current time and date according to the GS550 internal clock.
2. Press **Next** to go to menu 5D2) Time clock battery. Self-test pass or fail.
3. Press **Next** to go to menu 5D3) External power voltage.
4. Press **Next** to go to menu 5D4) Display internal temperature.
5. Press **Next** to go to menu 5D5) GS550 base station id. The base station id should be the same as the GS550 display serial number printed on the left side of the box
6. GS550-03 portable displays only: press **Next** to go to menu 5D6) Battery level. The battery level of the onboard rechargeable battery pack is indicated.
7. Press **Next** to go to menu 5D7) Radio. FCC, IC indicates Federal Communications Commission (U.S.A.) and Industry Canada certification, CE indicates European Community certification. The frequency used by the system network is indicated on the second line.
8. Press **Exit** three times to return to the operation display.

Digital Input Diagnostic

1. Press **Menu** → **Back** → **Enter** → **Back** → **Enter** to go to menu 5E4) Blue Wire. The page shows the blue wire digital input status.
2. Press **Exit** three times to return to the operation display.

Installation

Display GS550

Important! Do not crack or puncture the membrane fascia. The GS550 display is splash and rain proof. Waterproofing depends in part on the integrity of the membrane.

Important! Do not power wash the display. The GS550 display is not designed to withstand high-pressure washing devices that can erode the membrane fascia seal or create fissures in the membrane fascia. Power washing the display voids warranty coverage.

Mounting Bracket

1. Determine the mounting location. The display may be installed either inside or outside the cab. It can be mounted on the dash, on a sidewall, or on the ceiling of the cab. To ensure reliable radio communication between sensors and the GS550, the antenna must not be in contact with metal and must have a direct and clear line of sight to the antennas of all sensors. The mounting bracket requires a flat surface of at least 2 inches in diameter on both sides and where the back of the surface is accessible in order to tighten the nuts.

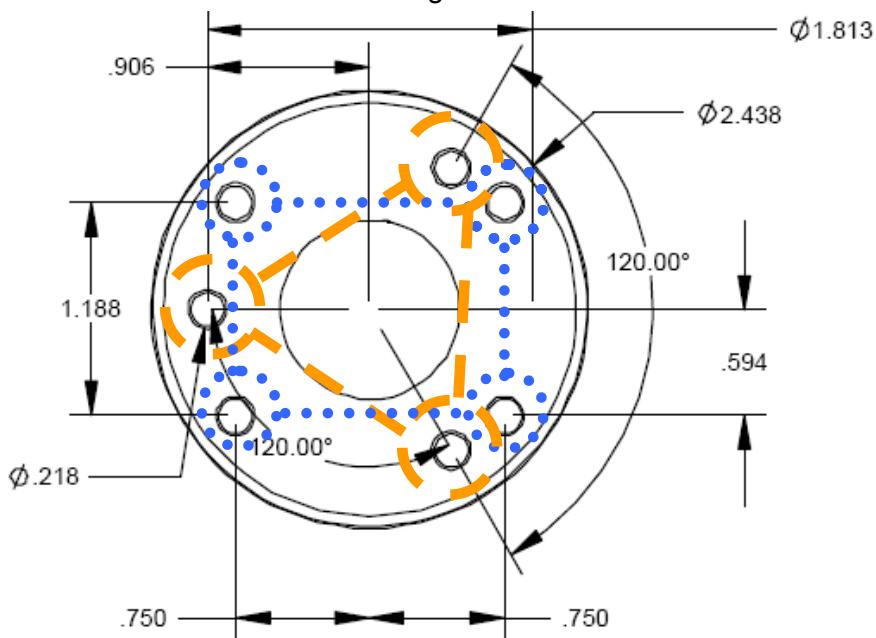


Figure: Display mounting bracket footprint

2. Drill $\frac{1}{4}$ inch boltholes through the mounting surface with a $\frac{1}{4}$ inch bit following either the three, or the four, hole configuration.
3. Install the display with the supplied bolts. Add the washers and the lock nut behind the mounting surface and tighten sufficiently.

Tip: If the nuts are on the outside of the cab, caulk with silicone between the washers and the cab to prevent water entry.

4. Loosen the wing nut of the bracket arm to adjust display orientation to facilitate viewing by the operator and then tighten it back up.



Figure: The power cable requires about 4 1/2 in. behind the display to protect the connector

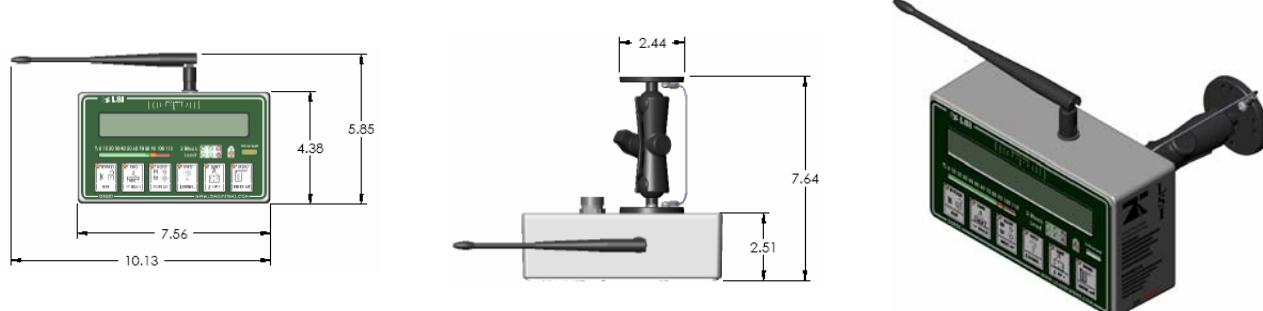
Antenna Position



Figure: Dipole Half Wave Elbow Antenna, part No TA008

For optimal performance the antenna should be positioned on its side such that it is parallel to the sensor antennas (but not pointing directly to or directly away from them).

- Adjust antenna position with the articulating base.
- The antenna must have 5 inches of clear space all around it.
- The antenna must have an unobstructed line of sight to all sensor antennas at all boom angles.



Power Supply and Lockout Connection

1. Connect the black wire (ground) to the negative terminal of the crane battery or the panel connection; alternatively bolt the black wire to the body of the machine with a $\frac{1}{4}$ inch or $\frac{5}{16}$ inch bolt. The ground connection must be strong enough to sustain 3 amperes.
2. Connect the red wire to a fused accessory source, rated at least 3 amperes, that supplies +12 or +24 volts when the crane is on. The GS550 will automatically detect the voltage level and adjust itself.

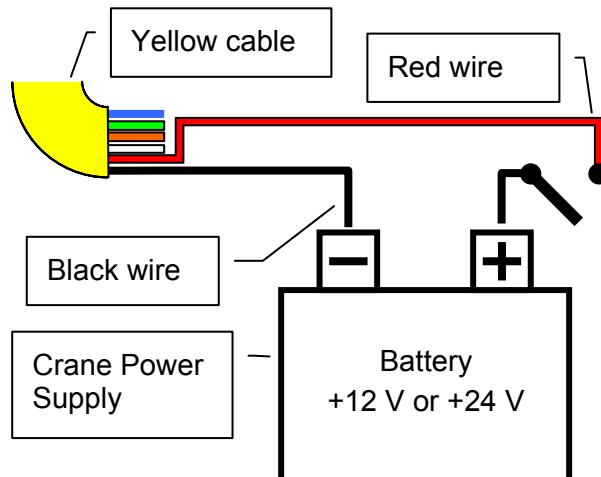


Figure: Connection without lockout

3. Lockout number 1 (if required): connect the white wire to a Bosch relay coil. Connect the other terminal of the relay to the ground. When operating properly the white wire will energize at the battery positive level. Troubleshooting; if no voltage is present on the white wire remove the load connected to the lockout. Current over 1.5 amperes on the white wire triggers an auto resettable fuse. Current flow will resume several seconds after the short circuit is eliminated.
4. Lockout number 2 (if required): the green wire functions in the same way as the white wire; see above. The green wire lockout signal could be triggered by a different set of alarms than the other lockout wires. See the Lockout Settings sub section of this manual.

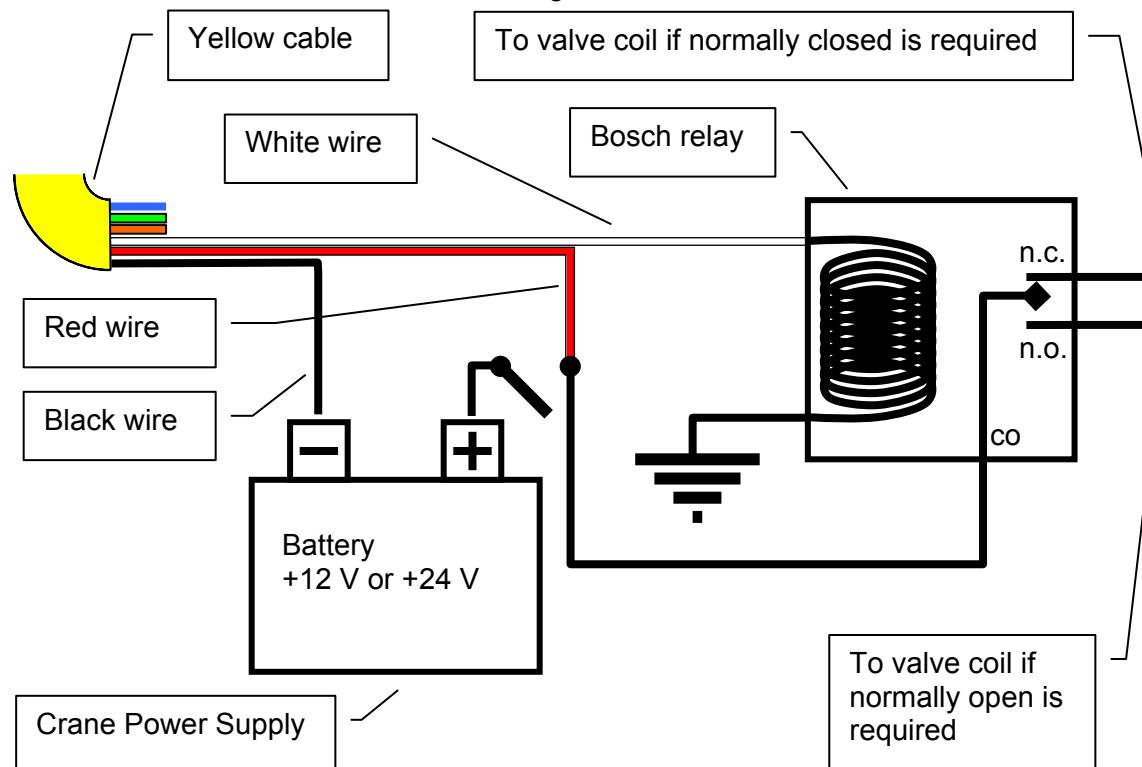


Figure: Connection with white wire lockout and recommended Bosch relay

5. Lockout number 3 (if required): the orange wire functions in the same way as the white and green wires; see above.
6. Optional Lockout number 4: if purchased with the fourth lockout option, the blue wire will function in the same way as the white and green wires, see above.
7. Connect the yellow cable to the GS550. The connector is waterproof and well rated for external environments. Simply connect the cable to the display and gently tighten the nut. Do not put a kink in the yellow cable where it enters the connector; any bend in the cable at the base of the connector must not be so severe as to break the internal connections where the cable meets the connector.

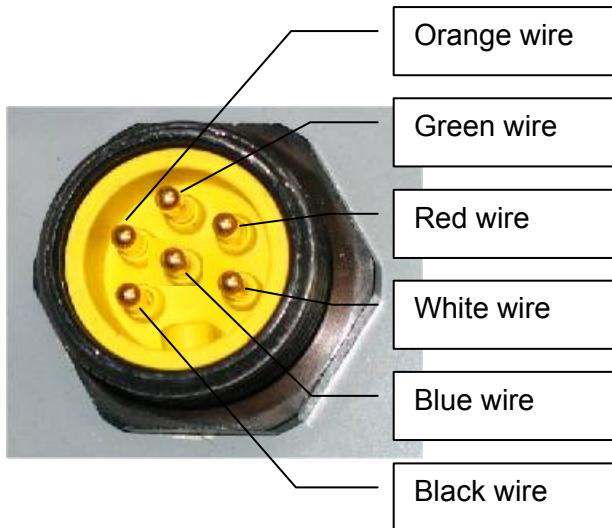


Figure: GS550 power supply connector

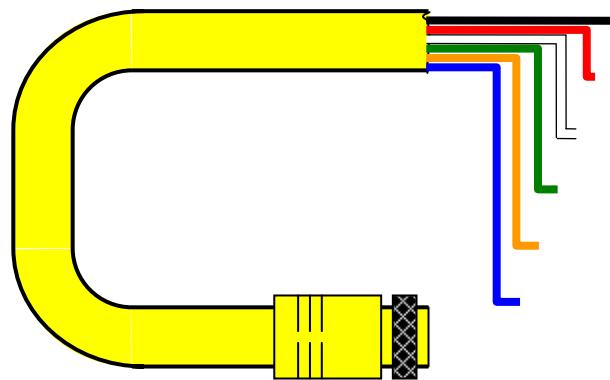


Figure: Power supply cable, part № LB006

Table: Power and Lockout Connection

Wire Colour	Function
Black	Negative (ground)
Red	Positive 12 or 24 volts (crane power supply)
White	Lockout № 1
Green	Lockout № 2
Orange	Lockout № 3
Blue	Optional 4 th lockout or digital input

Lockout Settings

Warning, alarm and lockout control is programmed in this menu. The GS550 can be programmed to generate alarms and lockout for almost all programmed limits, and two-block. Furthermore, warnings are generated when approaching programmed load limits and rated capacity (when applicable).

Warning level. When gross load (regardless of tare value) approaches the maximum limit for a load sensor the red overload alarm light will flash. The maximum limit for a load sensor is lower of the operator set limit (Limit Menu) or the WLL if rated capacity indication is used. The proportion of a limit that must be reached to trigger the overload warning is the warning level. The default factory setting for the warning level is 90%.

1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Enter** to access menu 4G1) Warning level.
2. Use **Up** and **Down** to adjust the warning level.

3. Press **Next** to advance to the alarm level adjustment page or press **Exit** three times to return to the operation display

Alarm level. All programmed and rated capacity limits and two-block will generate an audible alarm when the alarm level is reached. In the event of two-block or overload the appropriate alarm light will light solid. Other alarms will generate an intermittent alarm message on the LCD. The proportion of a limit that must be reached to trigger an alarm is the alarm level. The default factory setting for the alarm level is 100%.

1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next** → **Next** → **Next** → **Next** → **Enter** → **Next** to access menu 4G2) Alarm level.
2. Use **Up** and **Down** to adjust the alarm level.
3. Press **Next** to advance to the lockout level adjustment page or press **Exit** three times to return to the operation display

Lockout level. All programmed and rated capacity limits and two-block can generate a lockout signal when the lockout level is reached. By default the lockout wires carry crane power supply voltage as long as the display is in safe condition (to inverse lockout polarity see menu page 4G8). When a lockout level is reached voltage is be cut on all lockout wires linked to the lockout condition (see menu pages 4G4 through 4G7). The proportion of a limit that must be reached to trigger lockout is the lockout level. The default factory setting for the lockout level is 105%.

1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next** → **Next** → **Next** → **Next** → **Enter** → **Next** to access menu 4G3) Lockout level.
2. Use **Up** and **Down** to adjust the lockout level.
3. Press **Next** to advance to the white wire lockout trigger adjustment page or press **Exit** three times to return to the operation display

Lockout triggers. Different events can be programmed to cut voltage on the lockout wires of the yellow cable. Each lockout wire can be linked to a different combination of lockout conditions.

1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next** to access menu 4G4) White wire lockout trigger.
2. Select which alarm conditions will trigger lockout on the white wire.
3. Add the lockout codes for the selected alarms together to find the lockout trigger number.
4. Use **Up** and **Down** to adjust the white wire lockout trigger number.
5. Press **Next** to advance to the next wire trigger menu page and repeat steps 2 through 5, or, press **Exit** three times to return to the operation display.

Table: Default Triggers

<u>Lockout Wire</u>	<u>Default Trigger</u>
White	4301
Green	34
Orange	32767

Table: Lockout Codes

Condition	Code	Condition	Code
Maximum wind speed	1	Minimum slew	1024
Minimum angle	2	Maximum slew	2048
Maximum angle	4	Maximum tip height	4096
Overload	8	Maximum imbalance factor	8192
<i>Not used</i>	16	Minimum slack rope	16384
Maximum radius	32	Minimum list angle	32768
Maximum length	64	Maximum list angle	65536
Two-block	128	Minimum trim angle	131072
Maximum wind gust	256	Maximum trim rope	262144
Maximum rope payout	512		

Examples:

Maximum wind speed	1	Maximum radius	32
Maximum angle	4	Minimum angle	<u>+ 2</u>
Overload	8	Default green wire trigger	= 34
Maximum length	64		
Two-block	128		
Maximum tip height	<u>+ 4096</u>		
Default white wire trigger	= 4301		

Lockout relay inversion. By default the lockout wires carry crane power supply voltage as long as the display is in safe condition. When lockout is triggered voltage is cut on the lockout wires linked to the lockout condition.

Warning! Inverting lockout relays will allow crane operation in the event the GS550 display fails. Operating a crane without a functioning anti-two-block system and load and angle indication is dangerous and may be against the law.

Exceptionally the lockout relay can be inverted so that lockout wires carry no voltage in safe condition and carry crane power supply voltage when in a triggered lockout condition. In this case if the display fails, crane functions will not lockout.

1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Enter** → **Back** to access menu 4G8) Lockout relay inverted.
2. Use **Up** and **Down** to switch between “yes” and “no”.
3. **Exit** three times to return to the operation display.

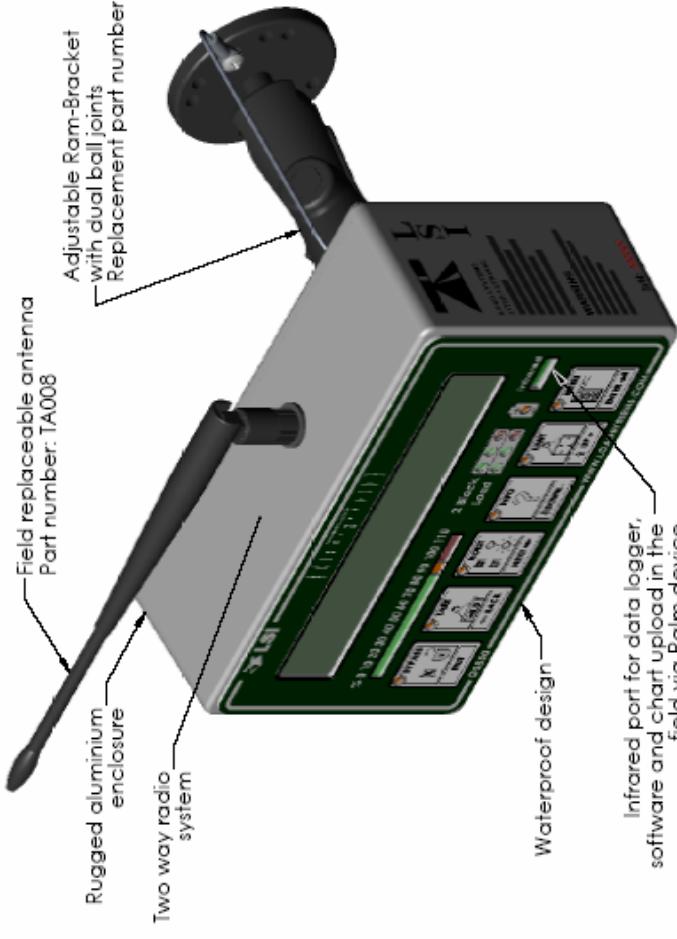
Password Settings

Three levels of access are available: administrator, operator and public. The administrator password is required to change the operator password. In the event both the administrator and the operator passwords are lost please call your LSI representative. Menus accessible from the operation display can be individually protected by the operator password.

1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next** → **Next** → **Next** → **Next** to access the menu 4H1) Set administrator password.
2. 4H1) Set administrator password: Press **Next** three times to advance to the set user password page or, to change the administrator password, use **Up** and **Down** to adjust the flashing letter and then use **Next** to advance to the next letter. Press **Enter** to save any changes.

3. 4H2) Set user password: Press **Next** three times to advance to the tare menu protection page or, to change the user password, use **Up** and **Down** to adjust the flashing letter and then use **Next** to advance to the next letter. Press **Enter** to save any changes.
4. Menu 4H3) Tare protected: use **Up** and **Down** to switch between “yes” and “no” and press **Next** to advance to the next menu page.
5. Repeat step 4 to adjust password protection for each menu as required. Press **Enter** at any time to save changes made. Press **Exit** at any time to return to menu 4) Installation. If there are any unsaved changes the display will request confirmation: press **Enter** to save before quitting or press **Exit** to quit without saving.

Datasheet



Field replaceable antenna
Part number: TA008

Rugged aluminium enclosure

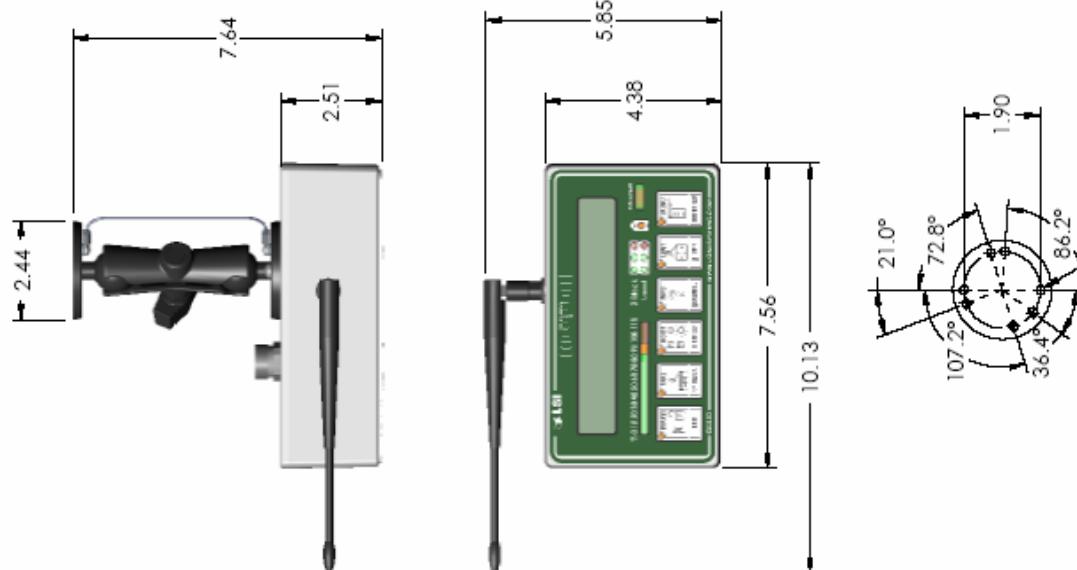
Two way radio system

Adjustable Ram-Bracket
with dual ball joints
Replacement part number: QB021

Waterproof design

Infrared port for data logger,
software and chart upload in the
field via Palm device.

Weight Units	Pounds, short tons, long tons, kilograms, metric tons
Power supply required	10 to 30 VDC, 1A; plus 1A per lockout relay connected
Power supply cable	Not included. Part number: LB006; 6 way, 6ft length
Display	2 lines 20 characters LCD with adjustable contrast and night vision backlight
Data Logger Memory	More than 16,000 time stamped events
Output	Three internal momentary relays, 1A each
Operating temperature	-30 to +75°C (-22 to 167 °F), LCD visible from -25 to 75°C (-13 to 167°F)
Radio Frequency Band	900 MHz standard - European Community's 868 MHz as an option
Radio Power	15 dBm
Weight	2 lb
Options	One additional (fourth) relay; RS232 output



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REPRODUCTION IN PART OR AS A WHOLE
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PROHIBITED.

Φ 21
Ram Bracket Footprint.
Only 2 screws are necessary.

All dimensions are in inches
The information in this document is subject to change without notice.

PART NO: **GS550** DWG NO: **DS-GS550** REV: **2**

DESCRIPTION: **Wireless Display**

LSI
Load Systems International
www.loadsystems.com

Load Cell

WARNING! Capacity and safety factor for load cells and adapter plate assemblies are calculated for load along the intended axis of load (vertical with the assembly hanging free); side loading may cause load cell and adapter plate assembly to fail, causing load to drop. Lifts must be rigged such that the load cell and adapter plate assembly hang free and not be subjected to side loading.

Important! The load cell antenna must not be in contact with metal.

Important! The load cell antenna must have a clear line of sight to the GS550 display.

Important! The load cell antenna must point to the left or to the right of the boom; it must not point directly to, or away from, the GS550 display.

1. Install load cell bushings. Assembly of the load cell and adapter plates must be configured to the pin size required by the specific dead end or hook to which it is to be attached. In all cases, the bushings must be used where possible to adapt the holes in the load cell to the pins. Bushings must be secured with the hex screws provided, one on each side of the load cell.
2. Place at least one washer between adapter plate and pin head or nut on each end of the pin that links the adapter plates to the load cell. Additional washers should be added equally to each end of the pin as required to inhibit excessive lateral movement of load cell and adapter plates along the pin.
3. If the dead end or hook to be connected to the adapter plates requires a larger opening, washers may be placed between the load cell and the adapter plates equally on both sides of the load cell.

Important! On the smaller of the two pins, the space between the link and the plates should not exceed $\frac{1}{4}$ inch either side of the centred link regardless of washer placement.

4. In all cases the washers must be placed symmetrically such that the load cell is centred on the pins.
5. Secure the pins with the nuts and cotter pins provided.
6. A qualified person must verify every lift assembly before first use and periodically thereafter, including before any new, difficult or otherwise different lift.

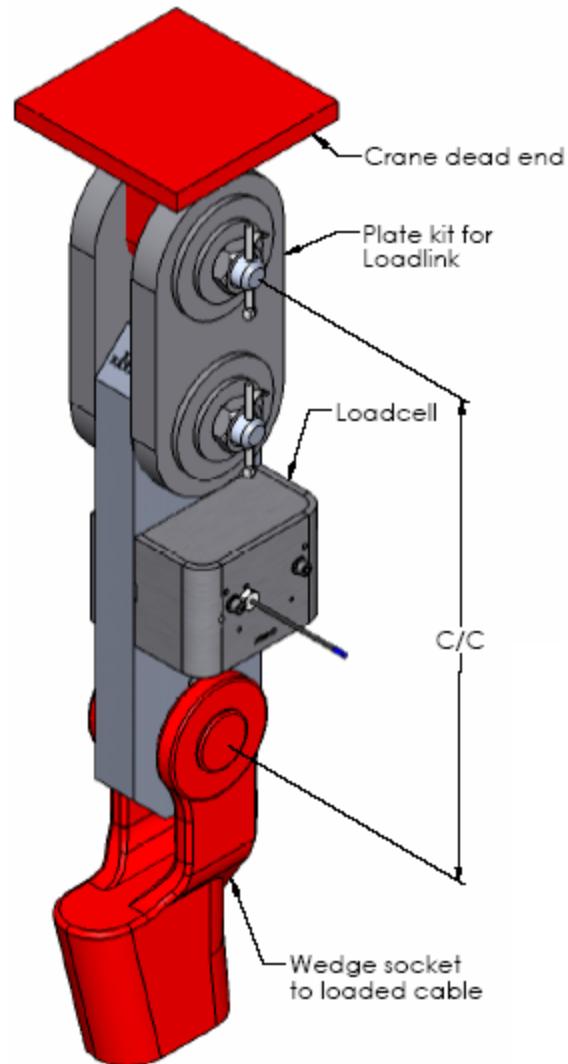


Figure: Typical load cell and adapter plate assembly installed

Angle Sensors for the Boom or Jib

WARNING! Keep the angle sensor away from the boom and any connecting metal structures when welding the metal lugs to the boom. Proximity to welding may cause permanent damage to the angle sensor and prevent accurate angle indication.

Mounting Procedure

The GS010 series angle sensors can be turned on by starting up the GS550 display to which they are programmed. The angle sensor can then assist in levelling itself with the red and green LED.

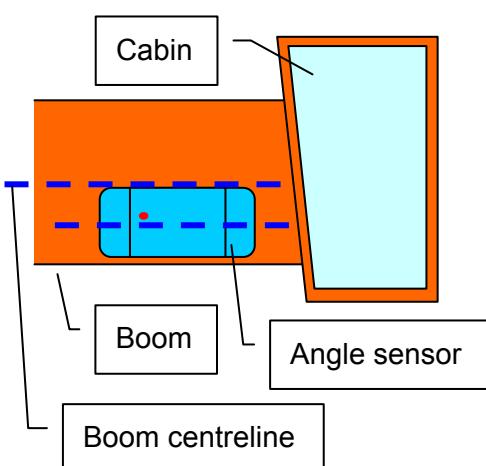


Figure: Angle sensor level with the boom – side view

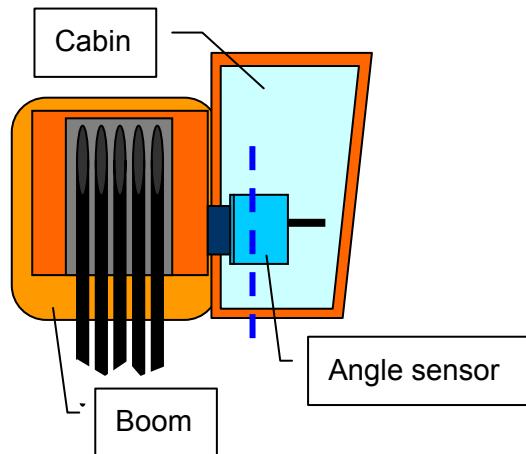


Figure: Angle sensor top/bottom axis within 15° of vertical – front view

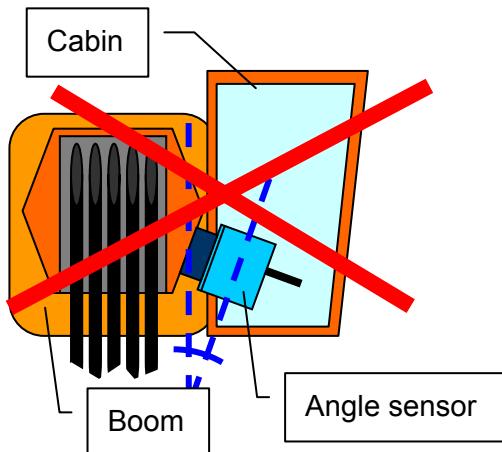


Figure: Do not mount the angle sensor with its top/bottom axis more than 15° from vertical – front view

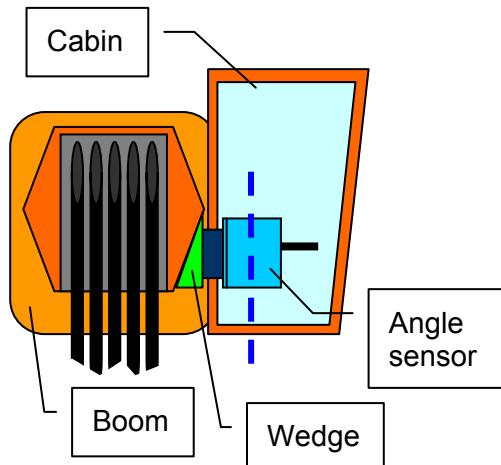


Figure: A wedge used to mount the angle sensor with its top/bottom axis within 15° of vertical – front view

1. Determine the angle sensor position.
 - a. The GS010-01 boom angle sensor can be mounted on either side of the boom.
 - b. The GS010-02 360° angle sensor must be mounted on the left side of the jib.
 - c. The angle sensor must be level with the boom centreline.
 - d. The top / bottom axis of the angle sensor must be within 15 degrees of vertical

- e. The angle sensor must have a clear line of sight to the cabin mounted display.
- f. The angle sensor antenna must not contact a metal object.

2. Install the welding pads; keep the angle sensor well removed from the weld site and any connecting metal objects while welding.
3. Mount the angle sensor to the weld pads with the screws and washers provided.
4. Verify angle indication on the GS550 LCD.

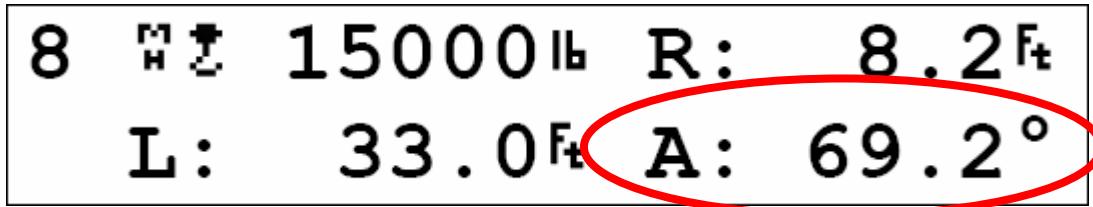


Figure: Typical operation page with boom angle indication

5. If the angle displayed by a GS010-01 boom angle sensor is a high negative value, then tilt the angle sensor up over 45 degrees, and then tilt back down to horizontal. The GS010-01 boom angle sensor will automatically detect on which side of the boom it is installed and correct angle indication accordingly.

Tip: To enable crane functions when alarm conditions are present, press Bypass for 10 seconds to enter the "Rig Mode". Press Bypass once to exit.

Angle Calibration Procedure № 1: Mechanical Set-Up

1. Level the boom such that it is perfectly horizontal; use a high quality bubble or digital angle sensor. If the GS550 display indicates 0.0 degrees then angle calibration is complete; if not then continue to step 2.
2. For GS011 angle/length sensors only: Carefully remove the cover of the LS101 cable reel.
3. Loosen the mounting screw in the slotted hole of the angle sensor mounting plate.
4. Pivot the angle sensor slightly until angle indication is correct.

Tip: When the angle sensor is moved very slowly, it may take several seconds to see an update at the GS550 display. Instead move the sensor up a couple of degrees, and then bring it back down to where it should be. The small light on the angle sensor flashes when it transmits a new value to the display.

Angle Calibration Procedure № 2: Correct with the GS550

Calibrate angle indication by adjusting the trim (offset) value in the GS550 display; the GS550 will then communicate the updated trim value to the sensor.

1. Position the boom at a precisely known angle.
2. Press **Menu** → **Next** → **Next** → **Next** to go to 4) Installation.
3. Press **Enter** → **Next** to go to 4B) Sensor Calibration.
4. Press **Enter** to go to the password page.
5. Use **Back**, **Next**, **Up** and **Down** to enter the user password, and then press **Enter** → **Next** to go to 4B2) Manual parameter calibration.
6. Press **Enter** to go to page 4B2A)
7. Use **Back** and **Next** to select the angle sensor to be calibrated.

8. Press **Enter** → **Next** to go to the trim adjustment page.

9. Use **Up** and **Down** to adjust the trim value.

Example: If angle indicated is 0.3° over the actual angle, adjust the trim value to -0.3.

Example: If angle indicated is 0.9° below the actual angle, adjust the trim value to 0.9.

10. Press **Enter** to save changes.

11. Press **Exit** four times to return to the operation display.

12. Verify accurate angle indication at both very high and very low angles.

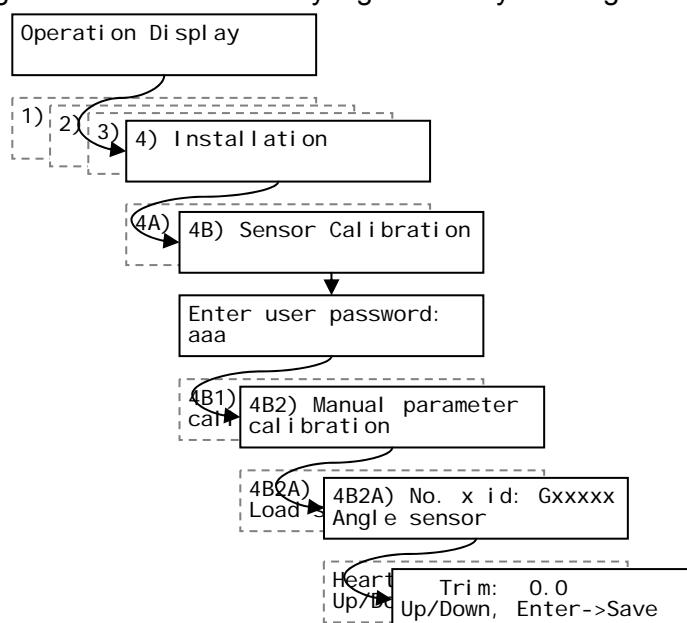


Figure: Angle Calibration Procedure № 2

Anti-Two-Block Switch GS050

WARNING! Keep the anti-two-block switch away from the boom and any connecting metal structures when welding mounting brackets to the boom. Proximity to welding may cause permanent damage to the anti-two-block switch and render the anti-two-block system unsafe.

Important! To ensure reliable radio communication between the anti-two-block switch and the GS550 display the following conditions must be respected:

- The antenna of the anti-two-block switch must not be in contact with metal.
- The anti-two-block switch antenna must point to the left or to the right of the boom; it must not point directly to, or away from, the GS550 display.
- The anti-two-block switch antenna must have a clear line of sight to the GS550 display; in most cases this means mounting the sensor on the same side of the boom as the operator's cab

1. Verify the GS050 anti-two-block switch is programmed to the GS550 display. Switches shipped with displays are pre-programmed in the factory. Test: if the switch has been programmed to the display then the display will go into two-block alarm when the wire rope of the switch is released. Press **Bypass** to silence the alarm until the next two-block event or simulation. If the switch has not been programmed to the display, this should be done before proceeding to step 2. See the sub-section How to Add a Sensor to the GS550 in this manual.
2. Position the sensor mounting bracket. To ensure that the sensor can pivot securely on the mounting bracket throughout the full range of boom angle, the mounting bracket must be positioned at a 30° from horizontal with the boom parallel to the ground and such that the locking pin of the mounting bracket points up. Bolt or weld securely.

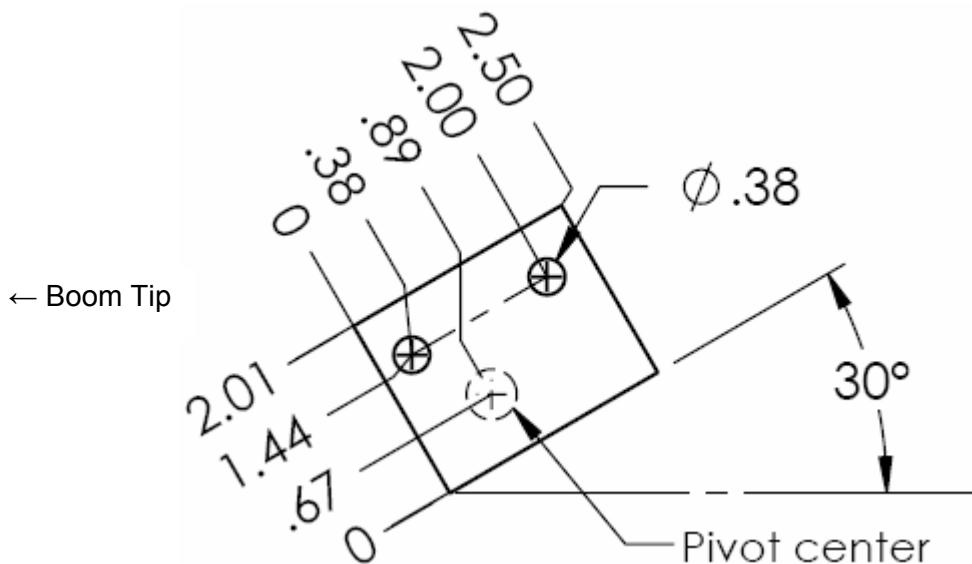


Figure: Bracket footprint and orientation. All dimensions are in inches.

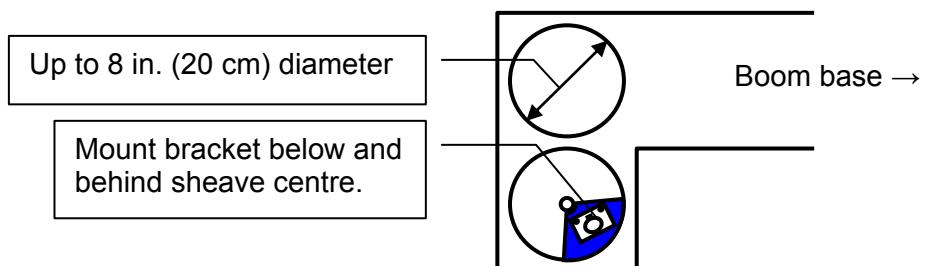


Figure: Anti-two-block switch placement on a telescopic boom

If the head sheave diameter is between 8 and 16 inches (20-41 centimetres) then two mounting brackets will be required to permit both live and dead end mounting.

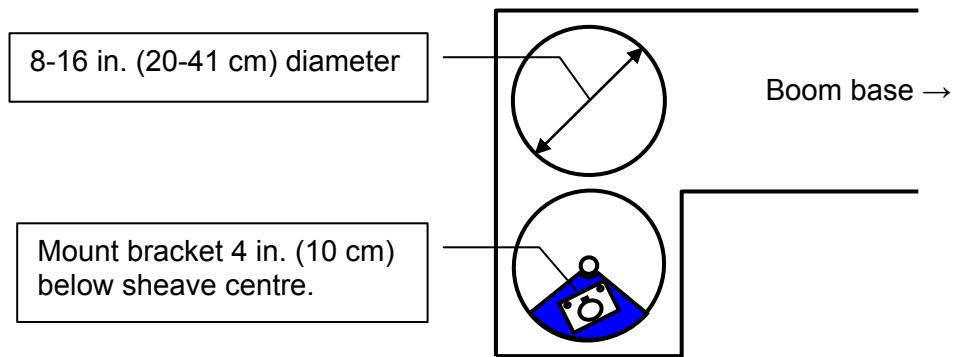


Figure: Anti-two-block switch placement for live end mounting on a lattice boom,

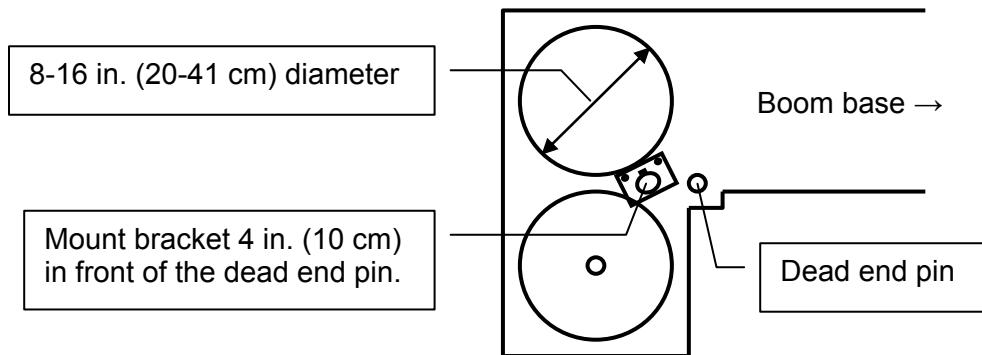


Figure: Anti-two-block switch placement for dead end mounting on a lattice boom

For live end mounting on multiple sheave blocks with sheaves greater than 16 inches (41 centimetres) in diameter consult your service representative.

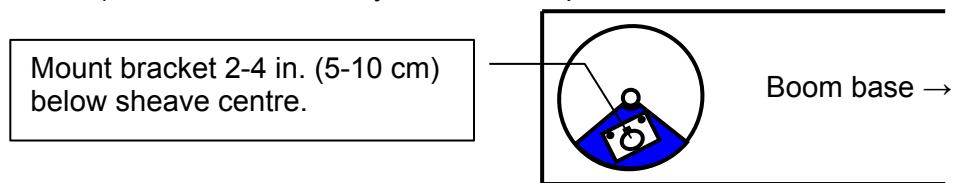


Figure: Jib, rooster or other extension, anti-two-block switch placement for single part of line operation only

For fast line weight installation place the anti-two-block switch mounting bracket directly below the sheave center as low and as close to the edge of the sheave as possible. Place the fast line weight mounting bracket on the opposite side of the sheave with the chain hole pointing down and lined up opposite the pivot of the anti-two-block switch mounting bracket.

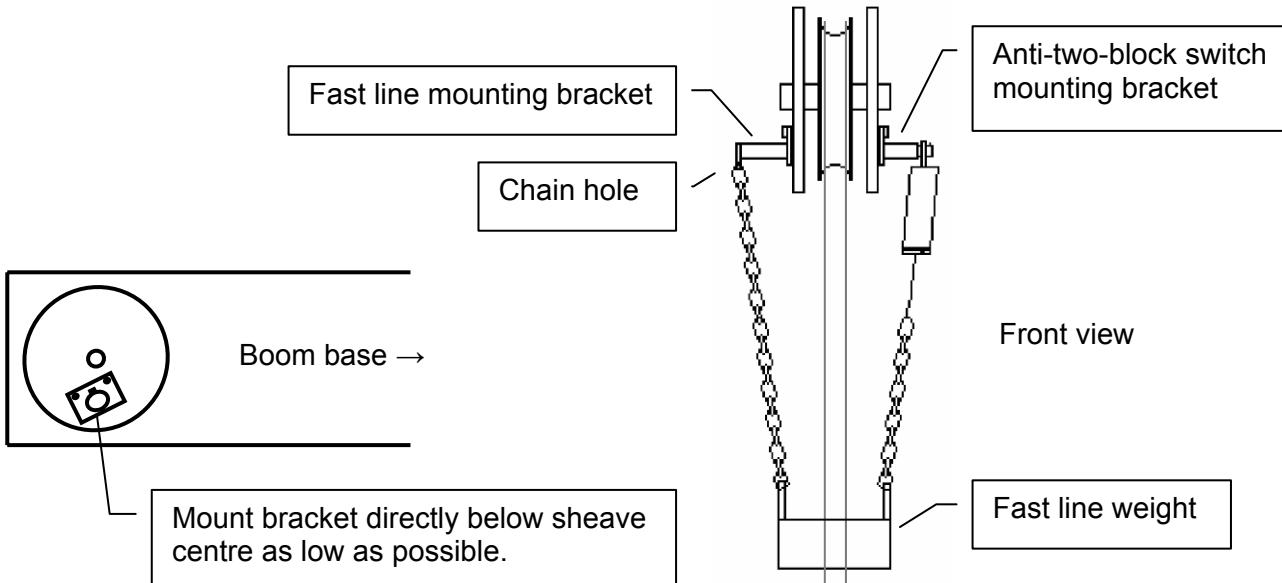


Figure: Fast line weight installation

3. Chain length adjustment № 1 – minimum boom angle

- At minimum boom angle, with no additional weight on the hook block and one part of line only, lift the boom just enough to have the hook block suspend and clear the sensor chain and weight.
- Hoist slowly until the red two-block warning lights comes on and the buzzer sounds. Note the hoisting distance remaining; this distance must be great enough to allow the operator and the lockout system, if installed, to prevent a two-block event. If necessary, add lightweight chain between the sensor and weight to increase warning distance. If still insufficient, contact your service representative.

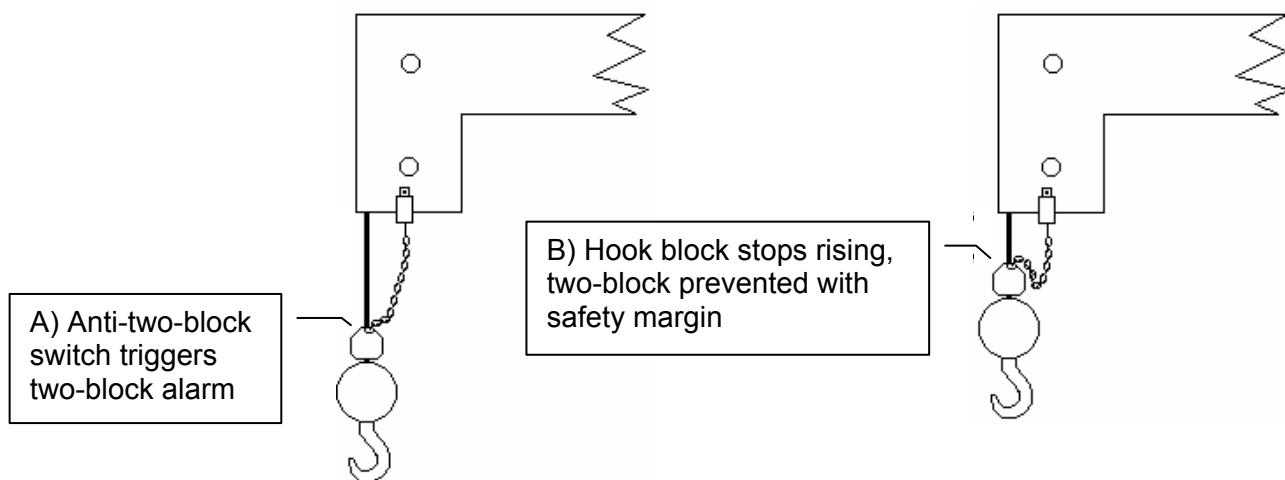


Figure: Anti-two-block weight chain length test at minimum boom angle

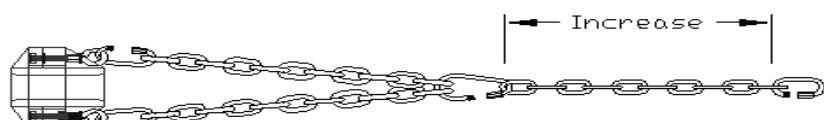


Figure: Anti-two-block weight chain length

4. Chain length adjustment № 2 – maximum boom angle
 - a. Raise the boom to the maximum angle.
 - b. Hoist slowly until the red two-block warning lights comes on and the buzzer sounds. Note the hoisting distance remaining; this distance must be great enough to allow the operator and the lockout system, if installed, to prevent a two-block event. If necessary, add lightweight chain between the sensor and weight to increase warning distance. Verify that the warning distance is equal to or greater than that determined at the minimum boom angle.

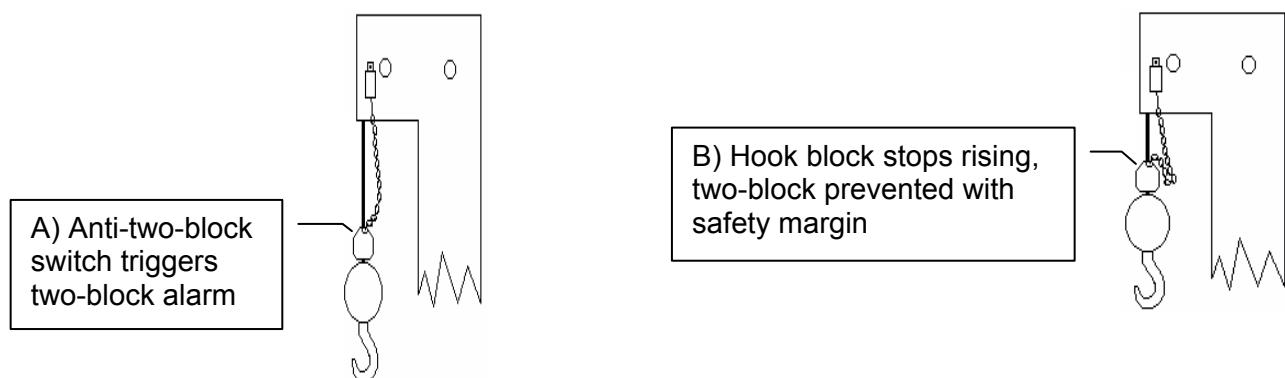


Figure: Anti-two-block weight chain length test at maximum boom angle

Tip: Have a second person stand off to the side of the crane to closely monitor the hoisting distance from the hook block to the head sheave block.

5. Chain length adjustment № 3 – speed test: Lower the boom until the weight height becomes visually clear to the operator. Repeatedly create two-block, progressively hoisting faster, to ensure that the warning and lockout work within acceptable amount of time and distance. Increase the length of the small chain if needed.

Length Sensor Cable Reel

WARNING! Arc welding will damage LSI sensors, causing immediate failure or greatly reducing functional life. Arc welding on or near LSI equipment will void warranty. Keep LSI equipment well clear of any arc welding.

The GS101 includes the LS101 cable reel and the GS011 angle/length sensor. The GS011 is concealed under the cover of the LS101, though the antenna is visible. Following cable reel installation and boom length indication calibration, boom angle indication will have to be verified and possibly calibrated. Refer to Angle Calibration Procedure № 1: Mechanical Set-Up and Angle Calibration Procedure № 2: Correct with the GS550 in this manual.

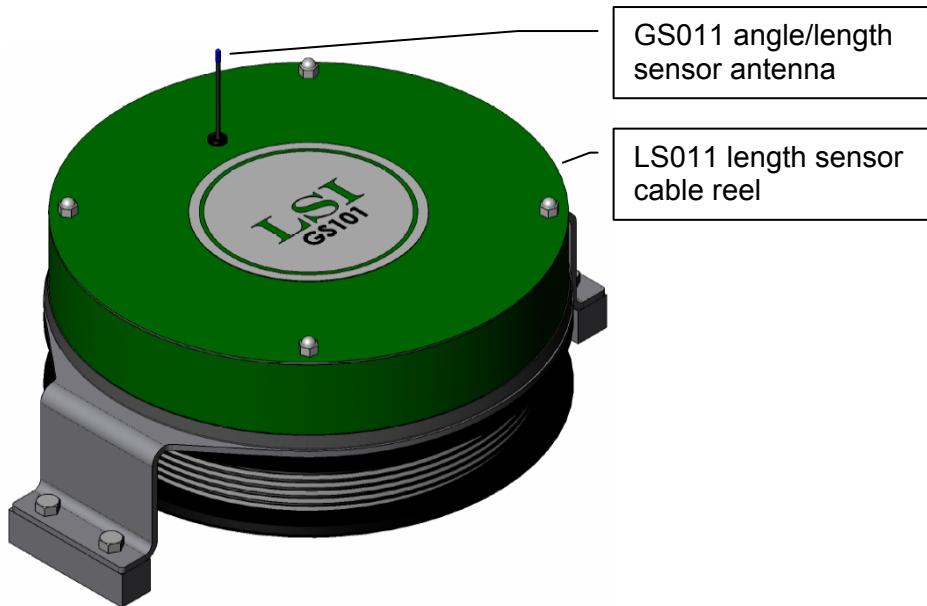


Figure: GS101 angle & length sensor

Maximum Boom Extension

Confirm the extension of the LS101 cable reel is compatible with the boom.

Step 1. Note the cable reel maximum extension: 100 feet $T =$ _____
 (30.5 metres) unless specified otherwise.

Step 2. Note the retracted boom length. $A =$ _____

Step 3. Note the maximum extended boom length, not including jib. $B =$ _____

Step 4. Calculate maximum boom extension. $C = B - A =$ _____

Step 5. Compare cable reel maximum extension (T) to maximum boom extension (C). $D = T - C =$ _____

Maximum cable reel extension must be greater than maximum boom extension.

Mounting the Cable Reel

1. Determine placement. Find a clear mounting position on the left side of the first (lowest) section of the boom. The mounting position should be close to the base of the boom; at least ten feet (three metres) from the tip of the first section and where the cable reel won't obstruct free boom movement at all boom angles and slew positions. Furthermore, the reel must be placed such that the cable has a clear straight line to the end of the last section at all boom lengths.

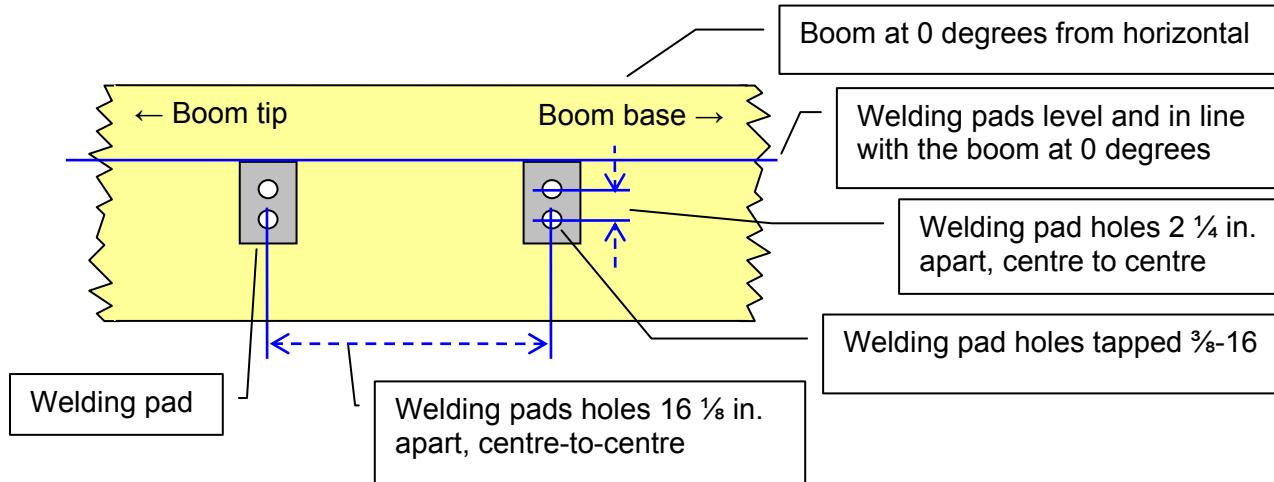


Figure: Cable reel mounting position

2. Mount the welding tabs. They must be placed parallel to each other, with 16 $\frac{1}{8}$ inches between the holes' centres. Install the tabs such that they create a level mounting position in line with the boom at 0 degrees.

Tip: When factory installed the GS011 angle/length sensor transmitter is integrated to the LS101 cable reel with the angle sensor zeroed. If the cable reel is installed perfectly level on the boom at 0 degrees, the angle sensor of the GS011 will also be zeroed. Minor adjustments to the angle sensor (within plus or minus two degrees) are possible after cable reel installation.

3. Attach the reel to the welding tabs with the bolts provided. The reel should be orientated with the GS011 angle/length sensor antenna coming out the top side of the cable reel cover.
4. Install the first cable guide (PA111) about 10 feet (3 metres) from the cable reel. Correct alignment of the first guide is critical to ensure orderly winding of the cable on the reel. Install the other guides at the end of each of the intermediate sections and the anchor (PA113) at the end of the last section. All guides must be aligned so as to permit unobstructed movement of the cable.
5. Pull out at least 5 feet (1 1/2 metres) of cable, but not more than half the excess extension D. Feed through the cable guides and attach to the cable anchor on the tip of the last boom section. If additional cable length is required to reach the cable anchor point remove winds from the reel without putting additional tension on the cable reel spring. There should be minimal tension on the cable reel spring when the boom is fully retracted.
6. Verify the boom length indicated on the GS550 LCD. Boom length is indicated following the length abbreviation "L", typically on the first or second operation page. Boom length indicated should equal the actual total boom length. The actual boom length is the distance from the boom base pin to the head sheave centre as measured along the boom centreline. Depending on the exact placement of the cable reel and the cable anchor the displayed length may differ from the actual length.

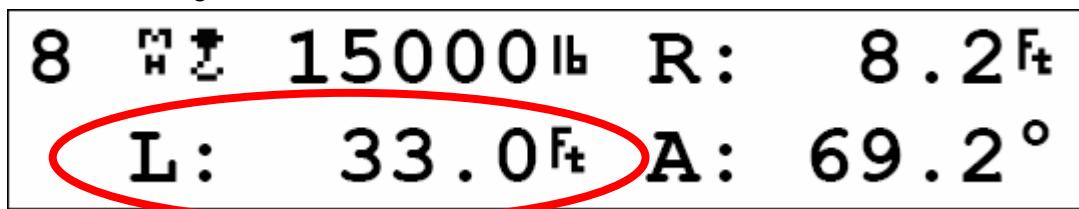


Figure: GS550 LCD – typical operation page two with boom length indication

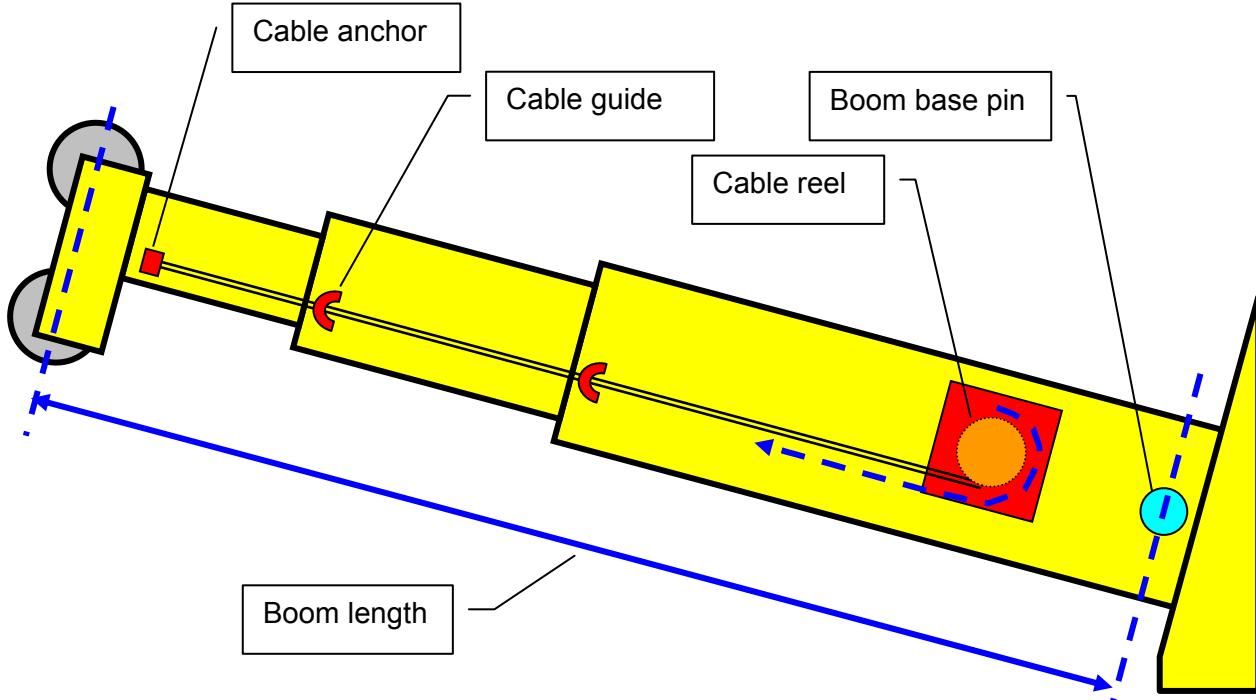


Figure: The actual boom length

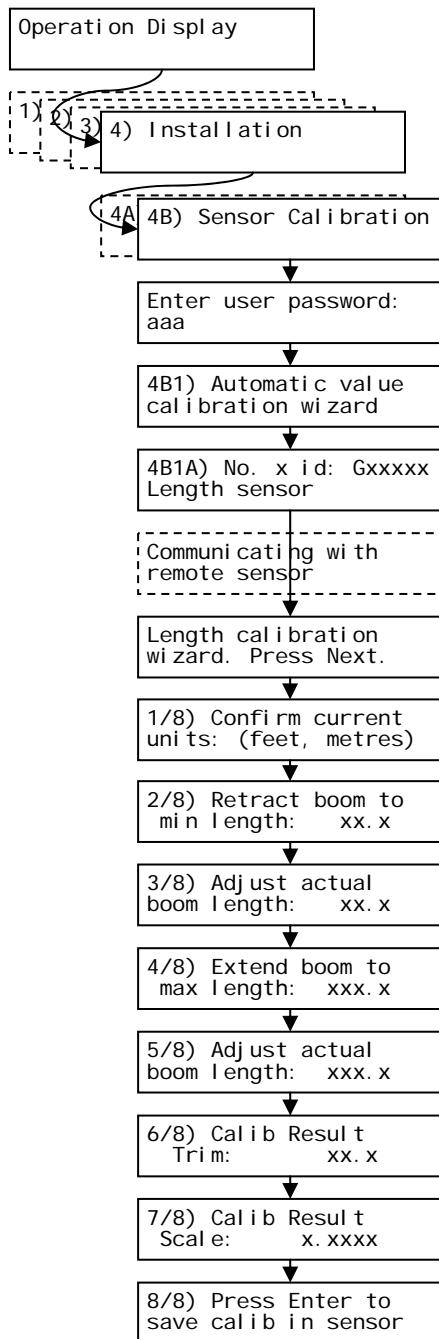
Boom Length Calibration Procedure № 1: Mechanical Set-Up

Important! Monitor length sensor cable length remaining as the boom is extended for the first time with the installed cable reel. This generally requires a second person (in addition to the operator).

1. Fully retract the boom
2. Adjust the loose wire rope at the boom tip so that the displayed boom length matches the actual boom length.
3. Fully extend the boom
4. Verify the boom length indicated at full boom extension matches the actual fully extended boom length. If not then follow Boom Length Calibration Procedure № 2: Correct with the GS550.

Boom Length Calibration Procedure № 2: Correct with the GS550

If the displayed boom length does not match the actual length of the boom retracted or extended and if it is not possible to easily correct by following Boom Length Calibration Procedure № 1 (previous page), then follow this procedure. This procedure is completed in the operators cab, it requires fully retracting, and then fully extending the boom, as prompted by the on screen instructions.



1. Press **Menu** → **Next** → **Next** → **Next** to go to menu 4) Installation.
2. Press **Enter** → **Next** to go to menu 4B) Sensor Calibration.
3. Press **Enter** to go to the password page.
4. Use **Back**, **Next**, **Up**, and **Down** to enter the user password, and then press **Enter** to go to 4B1) Automatic Value Calibration Wizard.
5. Press **Enter** to go to 4B1A).
6. Use **Back** and **Next** to select the length sensor, and then press **Enter** to confirm communication with the sensor is possible.
7. Press **Next** to start the wizard.
8. Note the units that will be used during the calibration wizard, and then press **Next**.
9. Fully retract the boom, and then press **Next**.
10. Use **Up** and **Down** to adjust the length value displayed to equal the actual fully retracted boom length, and then press **Next**.
11. Fully extend the boom, and then press **Next**.
12. Use **Up** and **Down** to adjust the length value displayed to equal the actual fully extended boom length, and then press **Next**.
13. Note the new trim value, and then press **Next**.
14. Note the new scale value, and then press **Next**.
15. Press **Enter** to send the new calibration to the length sensor.
16. Press **Exit** three times to return to the operation display.

Figure: The boom length calibration wizard.

Radius

Radius Verification and Adjustment

1. Verify the boom and luffing jib^{*} angles, and the boom length[†], are indicated correctly.
2. Verify the correct rated capacity chart is selected[‡].
3. Test № 1: measure the actual radius and compare to the radius indicated. Repeat with the boom at minimum angle, at 45 degrees, and at maximum angle; repeat at minimum and maximum boom length[†]. If radius indication is not accurate then go to step 4.
4. Measure the basic radius parameters on the crane (see pages 42 and 43).
5. Program the basic radius parameters in the radius settings menu (see page 41).
6. Test № 2: measure the actual radius and compare to the radius indicated. Repeat with the boom at minimum angle, at 45 degrees, and at maximum boom angle; repeat at minimum and maximum boom length[†]. If radius indication is not accurate then go to the next step.

Tip: If the difference between the displayed radius and actual radius remains constant at all boom lengths and angles, then correct by adjusting the slew offset. For example: if the radius displayed is always 2.3 feet longer than the actual radius, then subtract 2.3 from the slew offset.

7. If the crane is rigged with the main boom only, then go directly to step 11.
8. If the crane is rigged with a rooster, jib, or other extension then the advanced radius parameters must be measured on the crane (see page 44) and then programmed in the radius settings menu of the display (see page 41).
9. Test № 3: measure the actual radius and compare to the radius indicated. Repeat with the boom at minimum angle, at 45 degrees, and at maximum boom angle; repeat at minimum and maximum boom length[†]. If radius indication is not accurate then go to the next step.
10. Test for boom deflection: is the radius indicated equal to the actual radius with the boom at 0 degrees and at 90 degrees but greater than the actual radius with the boom at 45 degrees? If yes then adjust the boom deflection value to compensate:
 - a. Raise the boom to 45 degrees with a known load.
 - b. Compare the indicated radius with the actual radius. Change the boom deflection value and again compare the radius displayed with the actual radius. Repeat until the radius displayed equals the actual radius.

Tip: with the boom at 45° and the maximum load on the hoist, the boom deflection value should equal the difference between the actual and the displayed radius. With the boom at 45° and half the maximum load on the hoist, the boom deflection value should equal twice the difference between the actual and the displayed radius.

11. Test № 4: measure the actual radius and compare to the radius indicated. Repeat with the boom at minimum angle, at 45 degrees, and at maximum boom angle; repeat at minimum and maximum boom length[†]. If radius indication is not accurate then go to the next step.

^{*} When the hoist is rigged off a luffing jib only

[†] Telescopic boom cranes only

[‡] Systems with rated capacity charts programmed in the GS550 only

Radius Settings

1. Press **Menu** → **Next** → **Next** → **Next** to go to menu 4) Installation.
2. Press **Enter** → **Next** → **Next** to go to menu 4C) Radius Settings.
3. Press **Enter**; use **Up** and **Down**, **Back** and **Next** to enter the user password; and then press **Enter** to go to the first radius settings page 4C1) Boom length.
4. Use **Back** and **Next** to navigate between the radius settings pages and use **Up** and **Down** to adjust the settings.
5. Press **Enter** to save any changes and press **Exit** three times to return to the operation display.

Important! Radius settings 4C13 to 4C20 are specific to the hoist line (or sheave number) selected on page 4C12.

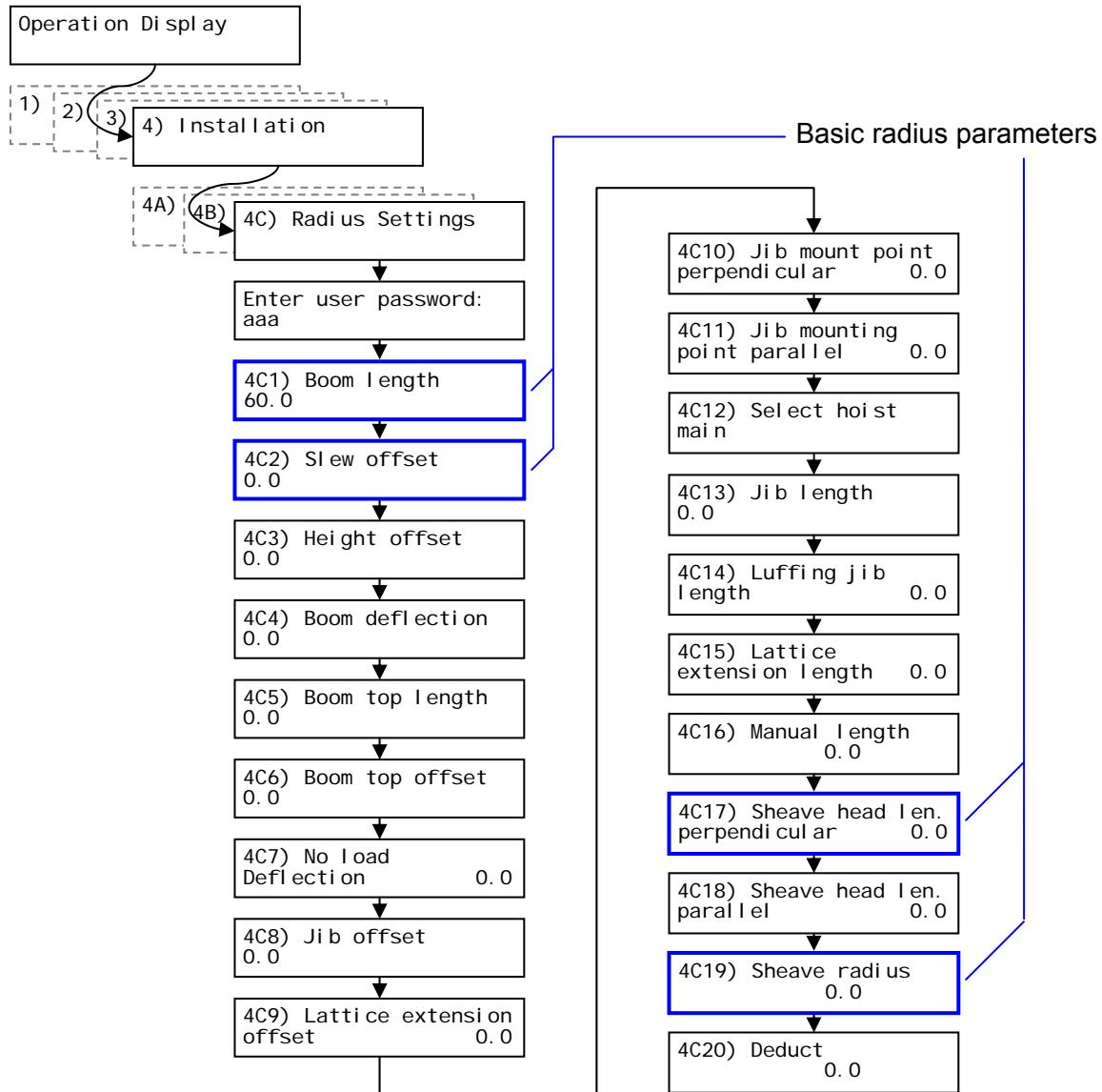


Figure: Radius settings

Basic Radius Parameters for a Lattice Crane

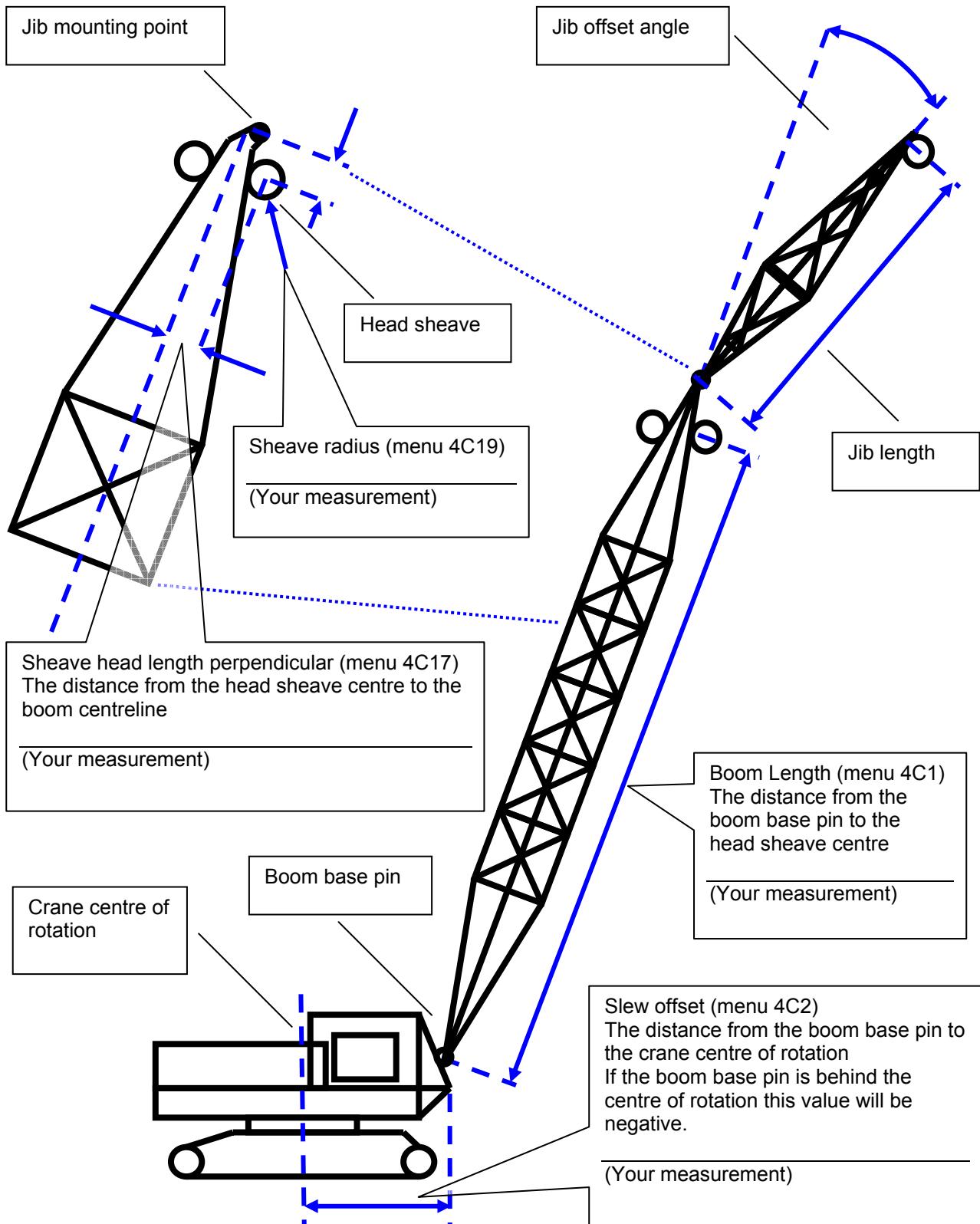


Figure: Basic radius parameters for a lattice crane

Basic Radius Parameters for a Telescopic Boom Crane

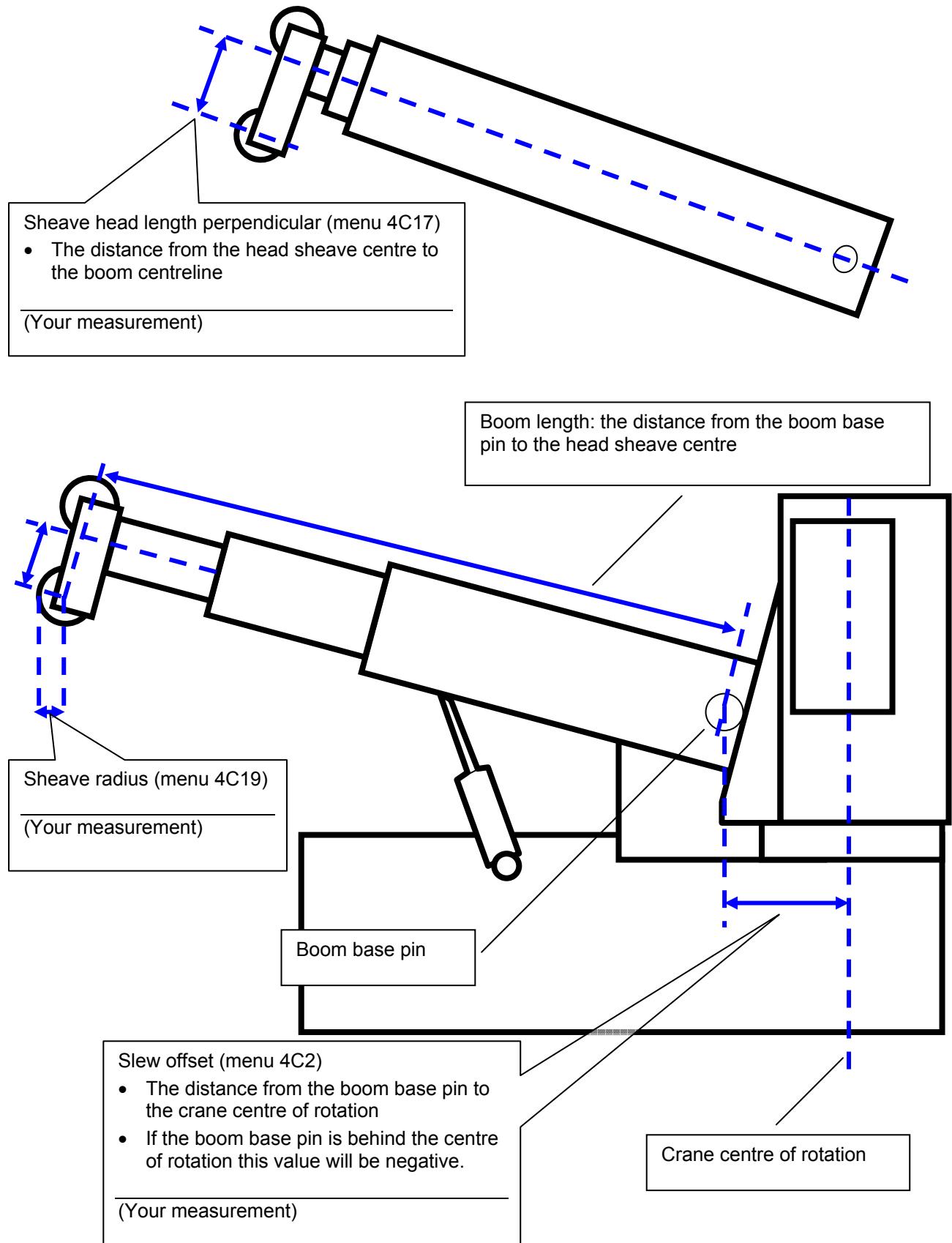


Figure: Basic radius parameters for a telescopic boom crane

Advanced Radius Parameters

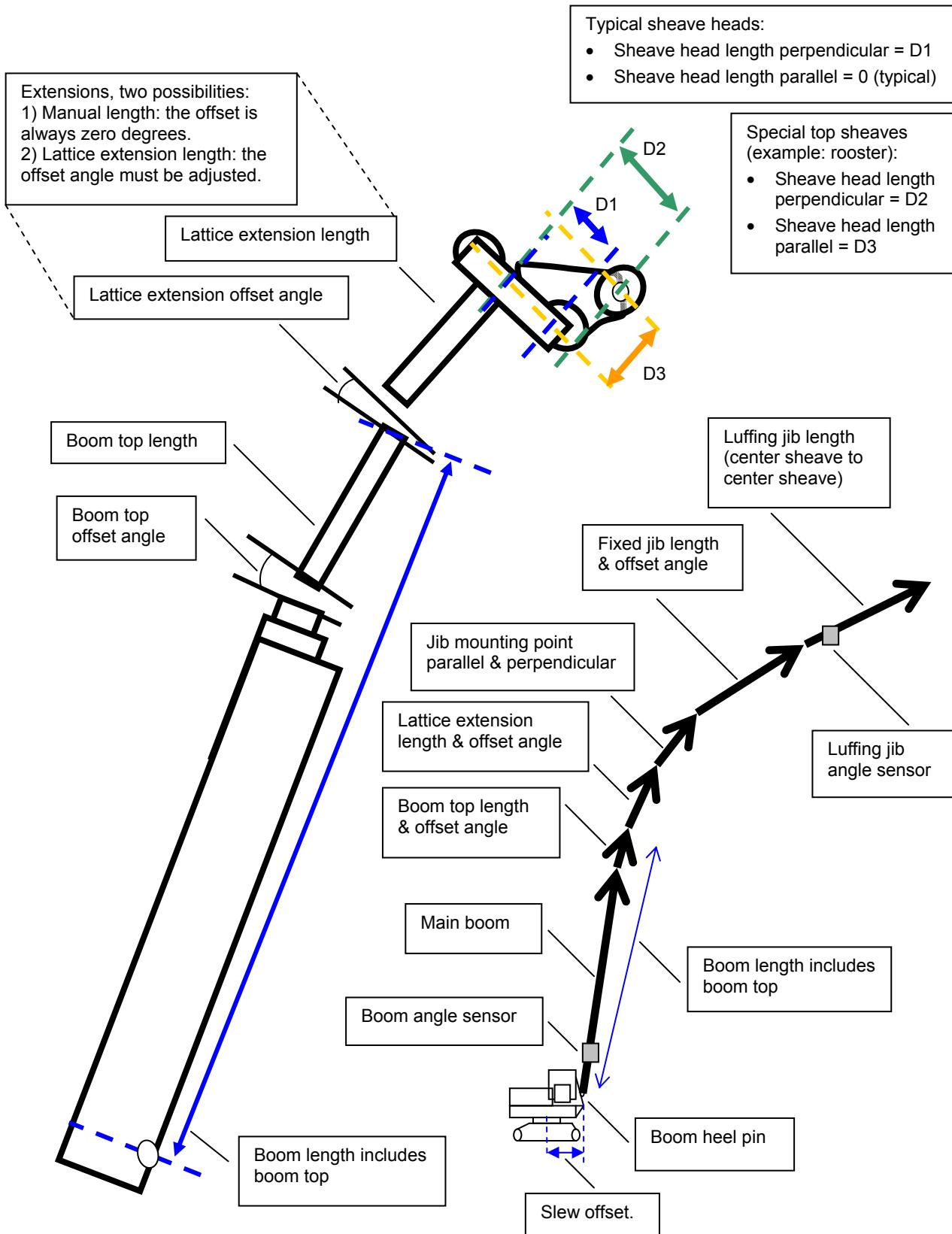


Figure: Advanced radius parameters

Wireless Wind Speed Sensor GS020



Figure: GS020 wireless wind speed sensor

WARNING! Do not weld in proximity to LSI sensor/transmitters.

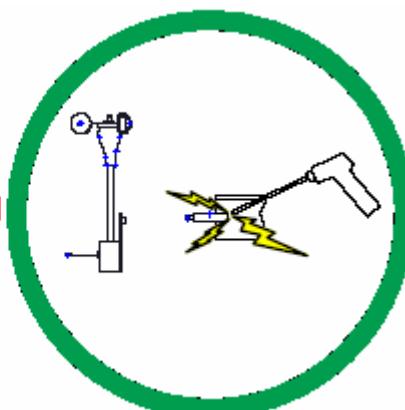
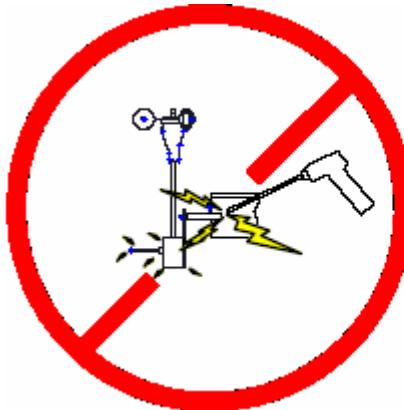


Figure: Do not weld on sensors!

1. Remove the mounting rod from the wind speed sensor.
2. Select the welding point for the mounting rod.
 - a. Install the mounting rod on the same side of the boom as the cabin mounted display, perpendicular to the boom, and at the highest point possible.
 - b. The wind speed sensor must pivot freely on the mounting rod at all boom angles.

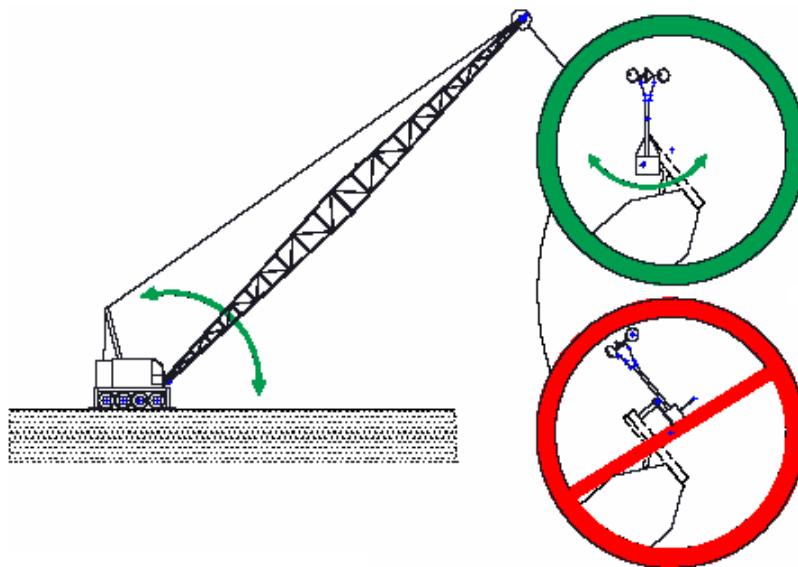


Figure: Swivel orientation

- c. The wind cups must be fully exposed to the wind and spin freely at all boom angles.

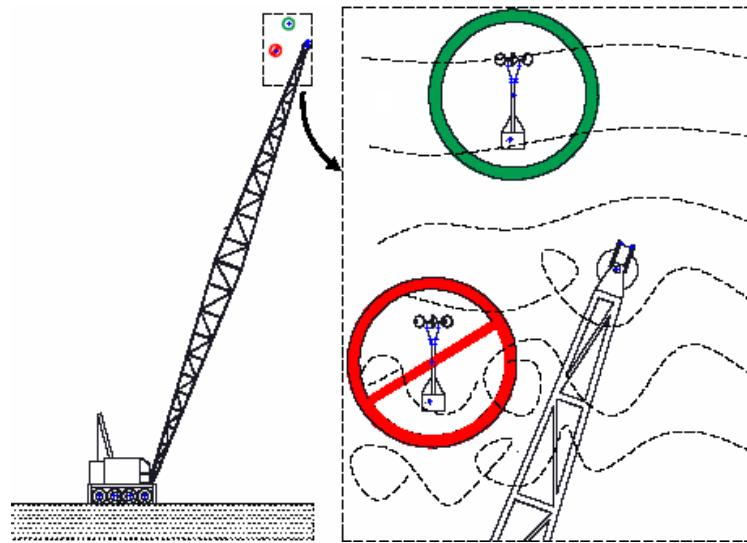


Figure: Wind clearance

- d. There must be a clear and unobstructed line of sight between the wind speed sensor antenna and the cabin mounted display unit

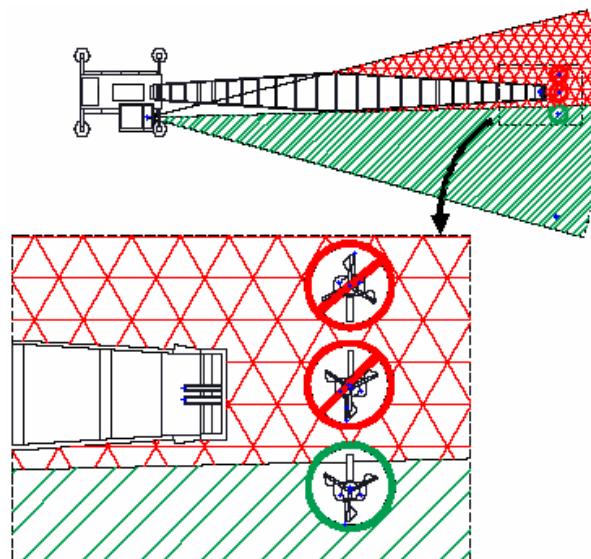


Figure: Radio line of sight

- e. The transmitter antenna must not contact any metal object.

Tip: Angle iron can be used to extend the mounting position clear of the boom top.

3. Weld the mounting rod to the boom at the selected point.
4. Re-position the wind speed sensor on the mounting rod, add the washer and secure with the cotter pin.

Wireless Load Pins

WARNING! Do not pull on a load pin by the pigtail.

LP011, LP015, and LP026

1. Mount the load pin to the boom tip or block by replacing the pin of the wedge socket. The load pin is directional and must be oriented correctly to indicate load accurately. Install the pin so that the bracket embraces the wedge socket and prevents pin rotation.

Tip: When installed at the boom tip the lot number can be read right side up and the "line pull" arrow points down towards the block. When installed at a single part block the lot number can be read upside down and the "line pull" arrow points up towards the boom tip.

2. Secure the load pin in place with a cotter pin or other suitable keeper device.

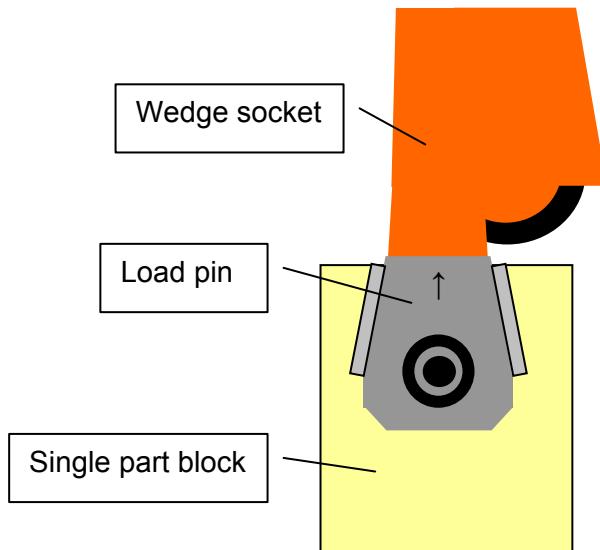


Figure: Load pin LP011, LP015, or LP026 – installation on a single part block

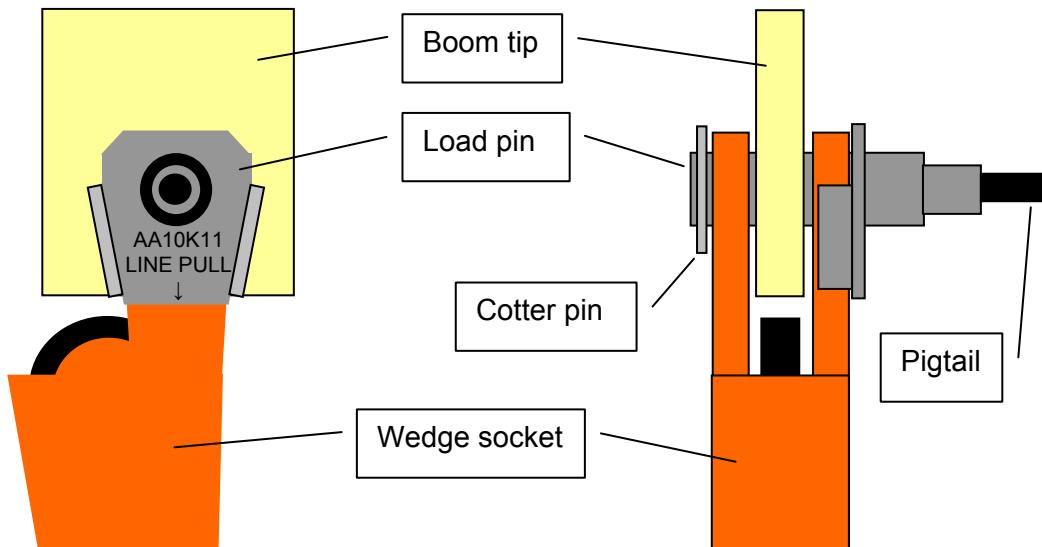


Figure: Load pin LP011, LP015, or LP026 – installation at boom tip

Load Pin Transmitter GS001

1. Determine the transmitter mounting position.
 - a. The load pin and transmitter pigtails must connect easily without stretching or kinking at all boom angles and working conditions. The jumper cable may be used between the load pin and transmitter to increase transmitter placement options.

- b. There must be direct unobstructed line of sight from the transmitter to the display; this may not be required on cranes with a maximum boom length less than 100 feet (33 metres).
- c. The transmitter antenna must not be in contact with any metal object.

WARNING! Do not weld in proximity to LSI sensor/transmitters.

2. Weld the mounting blocks where required.
3. Mount the load pin transmitter on the mounting blocks.

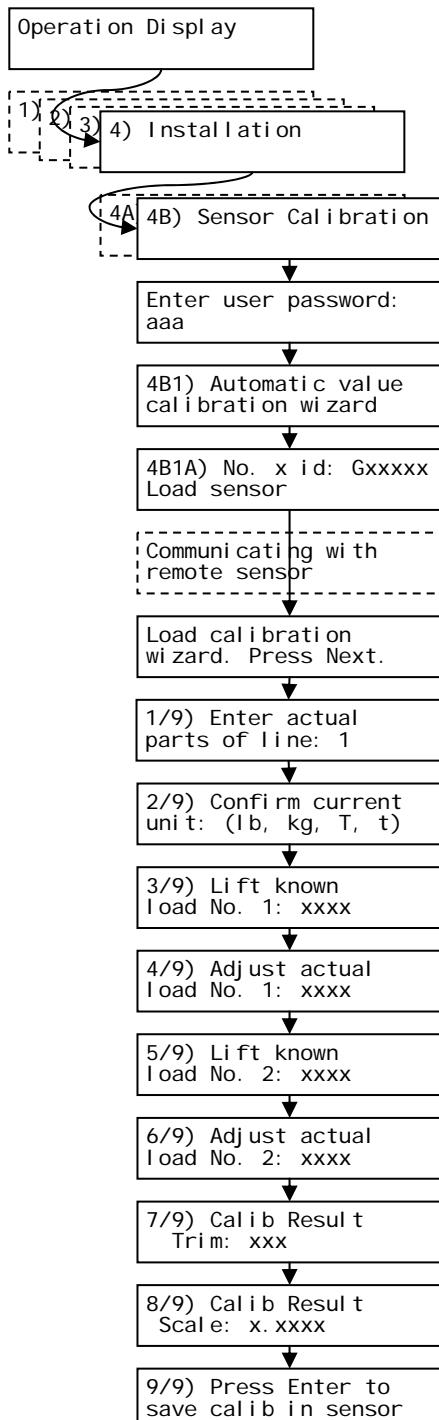


Figure: The automatic load calibration wizard.

Load Pins, Line Riders and Compression Cells: Calibration

Load pins, line riders and compression cells must be calibrated at installation and every time thereafter the installation, the load sensor or the load transmitter is changed.

Important! Do not recalibrate flat bar load links (part numbers GC005, GC012, GC018, GC035, GC060, GC100, and GC170).

This procedure requires two known weights. The first (light) weight should be about 10% of load sensor capacity and not less than 5%. The second (heavy) weight should be over 50% of capacity, and absolutely not less than 25%.

1. Press **Menu** → **Next** → **Next** → **Next** to go to menu 4) Installation.
2. Press **Enter** → **Next** to go to menu 4B) Sensor Calibration.
3. Press **Enter** to go to the password page.
4. Use **Back**, **Next**, **Up**, and **Down** to enter the user password, and then press **Enter** to go to 4B1) Automatic Value Calibration Wizard.
5. Press **Enter** to go to 4B1A).
6. Use **Back** and **Next** to select the load sensor, and then press **Enter** to confirm communication with the sensor is possible.
7. Press **Next** to start the wizard.
8. Use **Up** and **Down** to adjust the actual parts of line on the load sensor, and then press **Next**.
9. Note the units that will be used during the calibration wizard, and then press **Next**.
10. Lift the first (lighter) known load, and then press **Next**.
11. Use **Up** and **Down** to adjust the load value displayed to equal the actual known load lifted, and then press **Next**.
12. Lower the first load, lift the second (heavier) known load, and then press **Next**.
13. Use **Up** and **Down** to adjust the load value displayed to equal the actual known load lifted, and then press **Next**.
14. Note the new trim value, and then press **Next**.

15. Note the new scale value, and then press **Next**.
16. Press **Enter** to send the new calibration to the load sensor.
17. Press **Exit** three times to return to the operation display.

Four Point Lift

The following functions are available for applications such as container cranes and gantry cranes that require load indication from four load sensors simultaneously.

- Sum load indication
- Imbalance
- Slack Rope

These functions can be used to generate an alarm condition on the lockout wires of the GS550.

Sum Load Indication

When sum load indication is programmed the sum of the loads on the pre-determined load sensors is indicated by the operation display. To activate sum load indication program a “Sum load sensor” in the sensor list. The “id number” is used to identify the load sensors to be summed.

Sum maximum limit. The maximum limit for the sum load can be adjusted in the limit menu; the default maximum limit for sum load indication is 10000 (lb or kg depending on load display units).

Program sum load indication.

1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Enter** to go to the sensor list, menu page 4A1.
2. Press **Next** repeatedly to advance to the next available sensor position, usually following the four load sensors.
3. Determine the sum load cell “id number”. For example: id 1234 to indicate the sum of load sensors № 1, № 2, № 3, and № 4, or id 34 to indicate the sum of load sensors № 3 and № 4.
4. Use **Up** and **Down** to adjust the id number.
5. Press **Next**.
6. The sensor type should flash; use **Up** and **Down** to select the sensor type “Sum load cell”.
7. Press **Enter** to save any changes.
8. Press **Next** to program the imbalance sensor or press **Exit** three times to return to the operation display.
9. Adjust the sum maximum limit in the limit menu

Imbalance

Systems programmed for four load sensors and four load sum indication can be programmed with an imbalance sensor to warn against uneven load distribution or against unwanted rope payout if one corner of the load touches down before the others.

Imbalance factor limit. The imbalance factor is the percent difference between the load on one load sensor and the average load on the other three. The imbalance factor is calculated for each of the four load sensors and then compared to an adjustable limit. The default imbalance factor limit is 15%.

Imbalance minimum limit. Imbalance is not calculated when the four load sum is below the imbalance minimum limit. Adjust this limit to avoid generating an imbalance alarm under minimum load conditions (for example: with an empty container or with rigging only). The default imbalance minimum limit is 1000 (pounds or kilograms depending on load display units).

Program the imbalance sensor.

1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Enter** to go to the sensor list (4A1).
2. Press **Next** repeatedly to advance to the next available sensor position, usually following the four load sensors and the sum load sensor.
3. The id can be left at 0, press **Next**.
4. The sensor type should flash; use **Up** and **Down** to select the sensor type Imbalance sensor. Only one imbalance sensor is required to calculate imbalance for all four load sensors.
5. Press **Enter** to save any changes.
6. Press **Exit** three times to return to the operation display.
7. Confirm the imbalance factor limit and the imbalance minimum limit in the limit menu.

Examples:

Imbalance factor calculation for load sensor № 1

$$\text{Load № 1 Imbalance Factor} = 100 \times \frac{\text{Average (Load 2, 3, and 4)} - \text{Load 1}}{\text{Average (Load 2, 3, and 4)}}$$

If the imbalance factor limit is 15%, then the system is safe.

A	7500	B	8100
C	8000	D	8200

$$\text{Load № 1 (A) Imbalance Factor} = 100 \times \frac{8100 - 7500}{8100} = 7.5 \%$$

If the imbalance factor limit is 15%, then an imbalance alarm is generated.

A	6800	B	8100
C	8000	D	8200

$$\text{Load № 1 (A) Imbalance Factor} = 100 \times \frac{8100 - 6800}{8100} = 16 \%$$

Slack Rope

Systems programmed for four load sensors and four load sum indication can be programmed with a slack rope sensor to warn against unwanted rope payout when the load touches down.

Slack rope minimum limit. The slack rope sensor compares the sum load to an adjustable slack rope minimum limit. When the sum load goes below the slack rope limit a slack rope alarm is generated. The slack rope limit is usually adjusted to less than the weight of all rigging below the load sensors. The default slack rope minimum limit for is 1000 (pounds or kilograms depending on load display units).

Program the slack rope sensor.

1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Enter** to go to the sensor list, menu page 4A1.
2. Press **Next** repeatedly to advance to the next available sensor position, usually following the four load sensors, the sum load sensor and the imbalance sensor.
3. The id can be left at 0, press **Next**.
4. The sensor type should flash; use **Up** and **Down** to select the sensor type Slack rope sensor. Only one slack rope sensor is required to calculate slack rope for all four load sensors.
5. Press **Enter** to save any changes.
6. Press **Exit** three times to return to the operation display.
7. Adjust the slack rope minimum limit in the limit menu

List and Trim Angle Sensor

The GS010-03 is a two axis angle sensor designed to detect both list and trim angle. Minimum and maximum limits for list and trim angle are adjustable in the display. The display will generate an alarm if the limits are exceeded and can be programmed to generate lockout. Furthermore list and trim angle can be used to control rated capacity chart selection where required (example: barge cranes).

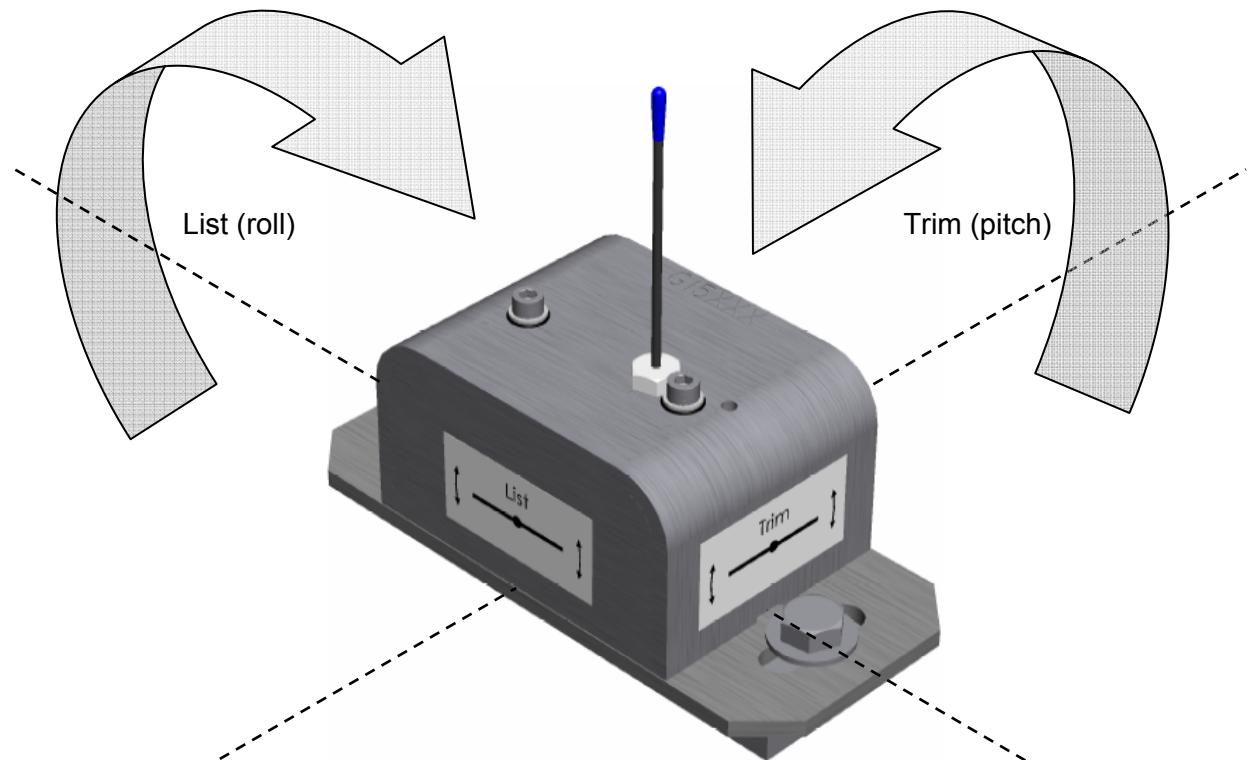


Figure: List and trim axes

Programming the GS550 for List and Trim Indication

For list indication, add the GS010-03 id number to the sensor list (menu 4A1) and select the sensor type “List sensor”.

For trim indication, add the GS010-03 id number to the sensor list (menu 4A1) and select the sensor type “Trim sensor”.

The maximum and minimum angles for list and trim indication can be adjusted in the limit menu. The default limits are 10.0° maximum and -10.0° minimum.

Mounting Instructions

WARNING! Remove the angle sensor from any connecting metal structures or surfaces when welding the metal lugs to the mounting surface. Proximity to welding may cause permanent damage to the angle sensor and prevent accurate angle indication.

1. Determine the angle sensor position.
 - a. The mounting surface must be flat and known to be level (0°) in both the list and trim axes.
 - b. The angle sensor must have a clear line of sight to the cabin mounted display.
 - c. The angle sensor must be installed horizontally, with the antenna pointing up.
 - d. The list and trim axes are indicated on the angle sensor, follow these indications to orient the sensor correctly for accurate list and trim indication.
 - e. The angle sensor antenna must not contact a metal object.
2. Install the welding pads; keep the angle sensor well removed from the weld site and any connecting metal objects while welding.
3. Mount the angle sensor to the weld pads with the screws and washers provided.
4. Verify list and trim angle indication by the GS550; in operation display, use Next to advance to the list and trim indication page.

Trim angle:	0.5°
List angle:	-1.2°

Figure: Trim and list angle indication

List and Trim Angle Calibration Procedure

Calibrate angle indication by adjusting the offset values for list and trim in the GS550 display; the GS550 will then communicate the updated offset values to the sensor.

1. Install the sensor at a precisely known list and trim angle.
2. Press **Menu** → **Next** → **Next** → **Next** to go to 4) Installation.
3. Press **Enter** → **Next** to go to 4B) Sensor Calibration.
4. Press **Enter** to go to the password page.
5. Use **Back**, **Next**, **Up** and **Down** to enter the user password, and then press **Enter** to go to 4B1) Automatic value calibration wizard.
6. Press **Enter** to go to page 4B1A)

7. Use **Back** and **Next** to select the trim (or list) sensor.
8. Press **Enter** → **Next** to go to the first step of the calibration wizard; note the uncorrected angle indicated.
9. Press **Next** to go to the second step, angle correction. Use **Up** and **Down** to adjust the angle value indicated until it is equal to the known angle.
10. Press **Next** to go to the third step, note the offset value.
11. Press **Enter** to communicate changes to the sensor.
12. Repeat steps 6 through 11 for the list angle.
13. Press **Exit** four times to return to the operation display.
14. Verify accurate list and trim angle indication.

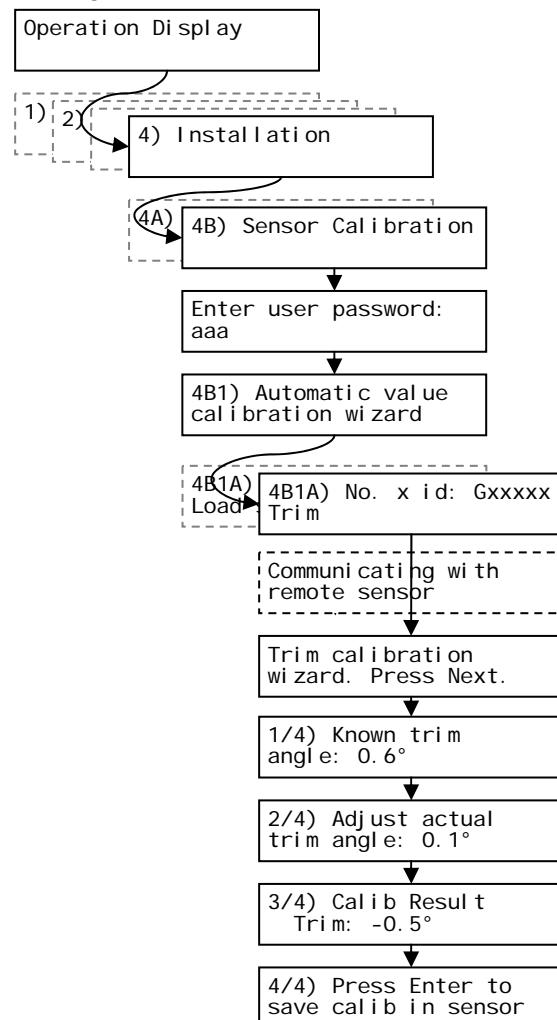


Figure: Trim angle calibration

Rope Payout

RopePayout:	120.5 ft
Rope speed:	2.4 ft / s

Figure: Rope payout display

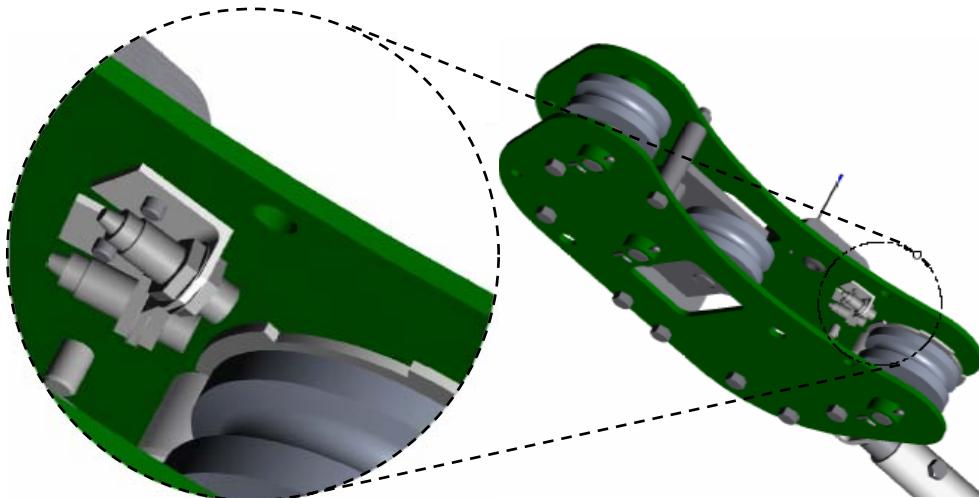


Figure: Rope payout on a line rider

Typically the rope payout sensor is factory installed on the line rider load sensor. Alternatively the rope payout sensor may be installed on an appropriate sheave. Power supply must be provided to the rope payout sensor. A GS550 display can then be programmed to communicate with the sensor and to indicate rope payout (length) and rope speed.

Rope Payout Calibration Procedure № 1: Mechanical Set-Up

1. Hoist up to reel in the wire rope fully.
2. Install the rope payout system.
3. Verify that the rope payout sensor is programmed in the sensor list (menu 4A1).
4. Zero the rope payout length in the Tare menu (see *Operation, Display GS550, Keypad, Tare* in this manual).
5. Hoist down to pay out a known length of wire rope (for example: 20 feet).
6. Verify the rope payout indicated matches the actual length of wire rope paid out. If not then follow *Rope Payout Calibration Procedure № 2*.

Rope Payout Calibration Procedure № 2: Correct with the GS550

If rope payout indicated does not match actual rope payout, and if it is not possible to easily correct by following Rope Payout Calibration Procedure № 1, then follow this procedure. This procedure requires hoisting up to fully reel in the wire rope, and then hoisting down to pay out a known length of wire rope. For accurate calibration the “known length” paid out must be accurately measured.

1. Press **Menu** → **Next** → **Next** → **Next** → to go to menu 4) Installation.

2. Press **Enter** → **Next** to go to menu 4B) Sensor Calibration.
3. Press **Enter** to go to the password page.
4. Use **Back**, **Next**, **Up**, and **Down** to enter the user password, and then press **Enter** to go to 4B1) Automatic Value Calibration Wizard.
5. Press **Enter** to go to 4B1A).
6. Use **Back** and **Next** to select the rope payout sensor, and then press **Enter** to confirm communication with the sensor is possible.
7. Press **Next** to start the wizard.
8. Note the units that will be used during the calibration wizard, and then press **Next**.
9. Hoist up (pay in) the wire rope and then press **Next**.
10. Use **Up** and **Down** to adjust the actual wire rope payout length and then press **Next**.
11. Hoist down (payout) the wire rope and then press **Next**.
12. Use **Up** and **Down** to program the actual wire rope payout length and then press **Next**.
13. Note the new trim value, and then press **Next**.
14. Note the new scale value, and then press **Next**.
15. Press **Enter** to send the new calibration to the rope payout sensor.
16. Press **Exit** four times to return to the operation display.

Rope Payout Limits

The minimum and maximum rope payout (length) limits and the maximum rope speed limit can be adjusted in the display in the limit menu. The maximum rope payout limit can be programmed to trigger lockout when exceeded, see menu 4G Lockout Settings. The minimum rope payout limit and the maximum rope speed limit will trigger an alarm when exceeded. The default limit for maximum rope payout is 300 feet; the default minimum limit is -300 feet. The default limit for maximum rope speed is 15.0 feet per second.

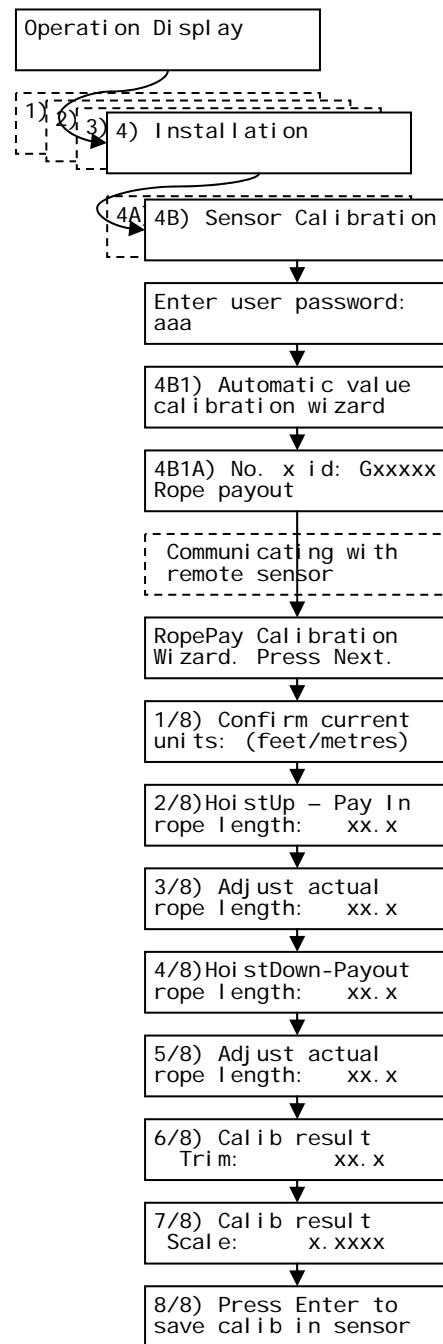


Figure: Rope payout Calibration.

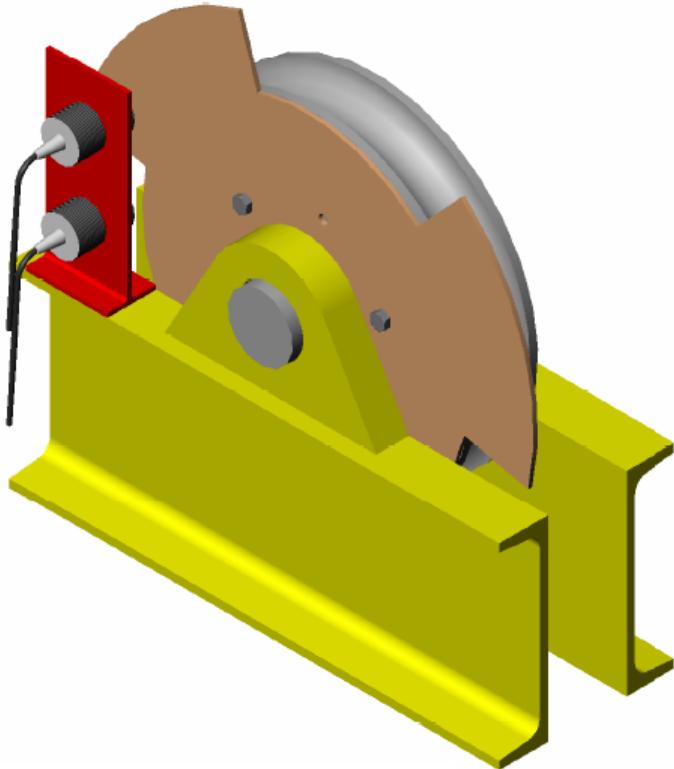


Figure: An alternative installation

Data Logger

The GS550 includes a data logger that records all significant events including actual sensor values and a date and time stamp. The data logger memory can hold over 16 000 records, this is equivalent to several days or several years of operation depending on the recording mode selected and machine use. The data can be extracted using a portable download tool and then transferred to a personal computer for analysis.

Recording Modes

Adjust the data logger recording mode as required:

1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next** → **Next** → **Next** → **Enter** to go to menu 4F1) Data logger mode
2. Use **Up** and **Down** to select the data logger recording mode.
3. Automatic modes only: press **Next** to advance to the adjustment page for the interval (automatic recording mode), variation (automatic variation recording mode), or threshold (automatic peak recording mode).
4. Press **Enter** to save any changes.
5. Press **Exit** three times to return to the operation display or press **Next** to adjust the data logger date and time (see below).

Tip: all alerts are recorded by the data logger regardless of the mode selected.

Alarm only. Record alarms only. All the other data logger modes also record alarms.

Automatic recording. A record is added at a specified interval. When the automatic recording data logger mode is selected on menu page 4F1 (see step 3 above) press **Next** to go to page 4F11) and then use **Up** and **Down** to adjust the record interval in minutes.

Important! Wind speed: the data logger recording mode must be set to automatic recording to log the data required by the wind speed report feature of the Data Logger Viewer software.

Automatic variation. A record is added when load increases by more than the operator adjusted percentage. When the automatic variation data logger mode is selected on menu page 4F1 (see step 3 above) press **Next** to go to page 4F11) and then use **Up** and **Down** to adjust the variation threshold.

Automatic peak. In the automatic peak mode the data logger analyzes the measured weight and records the peak value only. One threshold per load cell must be adjusted. When the weight drops by more than the peak threshold the peak weight is recorded. Only one event is recorded for each pick when the threshold is adjusted correctly. When the automatic peak data logger mode is selected on menu page 4F1 (see step 3 above) press **Next** to go to page 4F11) and then use **Up** and **Down** to adjust the peak threshold for the first load cell. Press **Next** to repeat for the second load cell etc. Up to four load cells can be programmed for automatic peak data logging.

User input. Available on request only, the status of all sensors is recorded on demand. A custom hardware modification to the GS550 display is required and a normally open push button must be installed on a digital input to the GS550 through a pre-determined wire of the power supply and lockout cable.

All data. All communications between a display and its sensors are recorded.

Date and Time

Adjust the data logger date and time as required:

1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** → **Next** → **Next** → **Next** → **Enter** → **Next** to go to menu 4F2) Adjust date.
2. The last two digits of the year should be flashing: use **Up** and **Down** to adjust the year.
3. Press **Next** to adjust the month.
4. The month should be flashing: use **Up** and **Down** to adjust the month.
5. Press **Next** to adjust the day.
6. The day should be flashing: use **Up** and **Down** to adjust the day.
7. Press **Next** to adjust the time.
8. The hour should be flashing: use **Up** and **Down** to adjust the hour from 00 (midnight) to 23 (11 pm).
9. Press **Next** to adjust the minute.
10. The minute should be flashing: use **Up** and **Down** to adjust the minute.
11. Press **Next** to adjust the second.
12. The second should be flashing: use **Up** and **Down** to adjust the second.
13. Press **Enter** to save any changes.
14. Press **Exit** three times to return to the operation display.

The Sensor List

All sensors in the GS550 system are programmed in the sensor list. The GS550 uses information from all sensors in the sensor list. Conversely the GS550 will not use or display information from sensors that are not programmed to the sensor list. If a sensor is removed from the crane then it must be removed from the sensor list. If a sensor is replaced the sensor list must be updated with the new id number.

WARNING! Information display from load, angle and boom length sensors that are not correctly installed will not be accurate.

WARNING! Rated capacity, radius, and tip height based on information from angle and boom length sensors that are not correctly installed will not be accurate.

Tip: To ensure communication sensors must be at least six feet from the GS550 display.

How to Add a Sensor to the GS550

1. Determine the radio identification number (id) of the sensor to be added. This number between 10000 and 99999 is engraved on the sensor.
2. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Enter** to go to menu page 4A1).
3. Advance to the next empty sensor position in the sensor list. Press **Next** repeatedly until the LCD shows “No sensor” on the bottom line. Up to 32 sensors may be added to the sensor list.
4. The id number should flash; this means it is adjustable. Use **Up** and **Down** to program the sensor id.

*Tip: Press **Up** and **Down** simultaneously to make the sensor id number jump directly to 15000. Press **Up** and **Down** simultaneously again to make the sensor id number jump directly to 10000. Press **Up** and **Down** simultaneously a third time to make the sensor id number jump directly to 0.*

5. Press **Next**.
6. The sensor type (“No sensor”) should flash; this means it is adjustable. Use **Up** and **Down** to select the sensor type.
7. Press **Enter** to save any changes made to the sensor list.
8. Press **Exit** three times to return to the operation display.

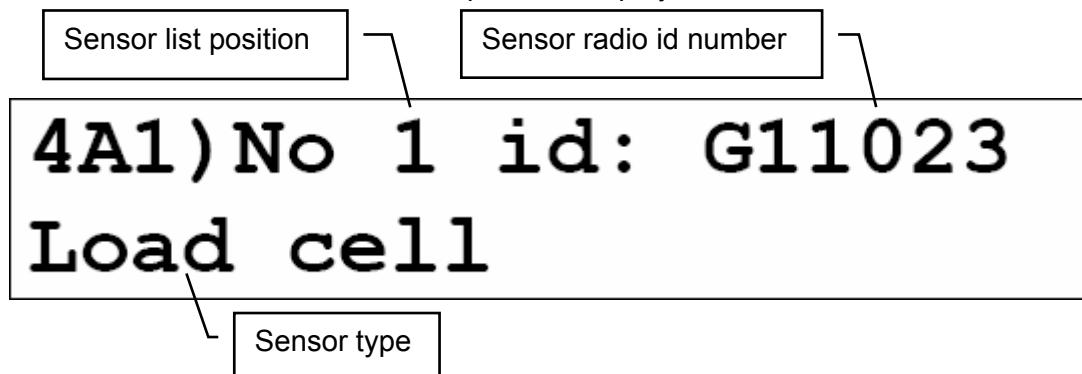


Figure: Menu page 4A1) – the sensor list

How to Remove a Sensor from the GS550

1. Determine the sensor to be removed. If more than one sensor of the same type has been added to the sensor list then determine the radio identification number (id) of the sensor to be removed before proceeding. This number between 10000 and 99999 is engraved on the sensor.
2. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Enter** to go to menu page 4A1).
3. Press **Next** repeatedly to advance to the page of the sensor list showing the id of the sensor to be removed.
4. The sensor id should flash, press **Next**, the sensor type should flash; this means it is adjustable. Use **Up** and **Down** to select “No sensor”. This will remove the sensor from the sensor list but retain the sensor id.

*Tip: Press **Next** and **Back** simultaneously to remove the sensor from the sensor list. The id number will revert to 0, and the sensor type will revert to "No Sensor".*

5. Press **Enter** to save any changes made to the sensor list.
6. Press **Exit** three times to return to the operation display.

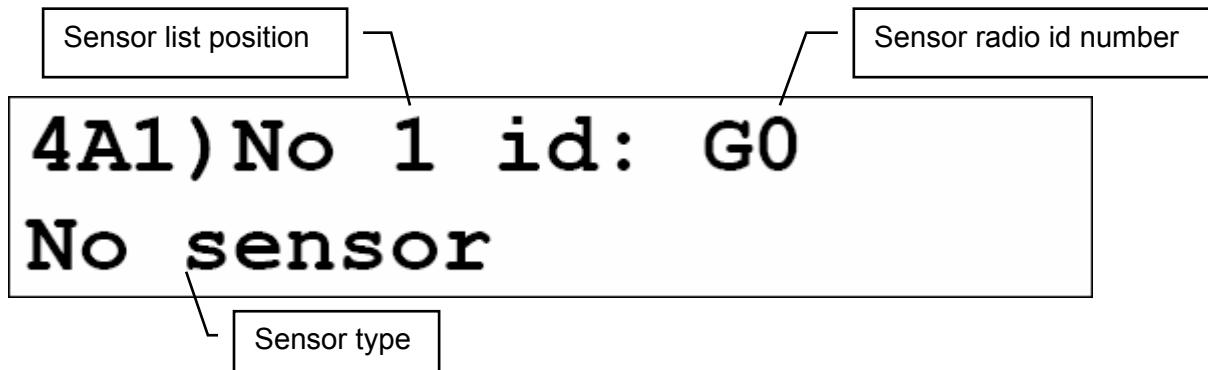


Figure: Menu page 4A1) – the sensor list

Network Options

Listen Only Mode

When the GS550 is started it normally wakes up the sensors in the sensor list and takes control of them. The last display started that is programmed for a sensor becomes that sensor's network controller. This means that if a second display is programmed for a sensor, it will take control of it; the sensor will no longer acknowledge communication from the first display. Occasionally it may be useful to monitor an installed system from a remote display without disrupting the existing network. The GS550 can be programmed to operate in “listening mode”. In this mode the GS550 will display information from programmed sensors without becoming the network controller.

Important! Sensors can only have one network controller at a time. To receive communication from a sensor without taking control of that sensor a display must first be programmed in “listening mode”.

Program the listen only mode.

1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** to go to menu 4I1).
2. Use **Up** and **Down** to switch between “network controller” and “listen only” modes.
3. Press **Enter** to save any change.
4. Press **Exit** three times to return to the operation display.

When a display is adjusted to listen only mode the following message flashes three times during the start-up routine: “The display is in listen only mode”.

Tip: To regain network control of programmed sensors adjust the GS550 to “network controller” (menu 4I1, see the procedure above), shut the display off, and then start it again.

Repeater

Communication between a GS550 and a programmed sensor can be routed through a different programmed sensor (repeater). This can be done either to extend the range of the network or to assist communication around a large radio obstacle. The battery life of the sensor repeated (source) will be reduced by about a year*. The battery life of the sensor repeater will be reduced to 35 days[†]. This function should not be used where it is not required.

Program a sensor repeater.

1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** to go to menu 4I2) Set-up sensor repeater
2. Press **Enter** to go to menu 4I21) Select repeater.
3. Use **Up** and **Down** to program the radio id number of the sensor that will be the repeater.
4. Press **Next** to go to menu 4I22) Select source
5. Use **Up** and **Down** to program the radio id number of the sensor that will be repeated.
6. Press **Next** to go to menu 4I23) Enter to save The new network path
7. Press **Enter** to save the new network path. The following messages will be displayed briefly:
8. “Parameters saved correctly”
9. “Communicating with remote sensor...”
10. “Configuration saved successfully”
11. Press **Exit** three times to return to the operation display

* Repeated (source) battery life estimated for standard product, using new factory specified batteries correctly installed, operating 32 hours per week. Individual results may vary with intensity of use, environmental conditions and other factors

† Repeater battery life estimated for standard product, using new factory specified batteries correctly installed. Individual results will not vary with of intensity of use; individual results may vary with environmental conditions and other factors.

Clear a sensor repeater

1. Press **Menu** → **Next** → **Next** → **Next** → **Enter** → **Next** to go to menu 4I3). Menu 4I3 details the last repeater programmed. When no repeater has been programmed the menu 4I3) displays the message “No repeater registered”
2. To shut down the last repeater programmed press **Enter**. The following messages will be displayed briefly:
 3. “Removing network path...”
 4. “Initializing network...”
5. To shut down additional repeaters repeat step 2
6. Press **Exit** three times to return to the operation display

Important! Test all system functions after setting up or removing a repeater. Shut off and then restart the GS550; within one minute the 2 Block and Load, “M” and “A” flashing radio status lights () should remain solid.

Wireless Sensor Update

It is possible to send a firmware update to a sensor using the GS550 (menu 4I4). For more information on installing a sensor update refer to the field service guide *How to Update the Firmware of a GS Series System* (document part number GM550 011) provided with the firmware update kit.

Portable Download Tool

The portable download tool consists of a compatible personal digital assistant (PDA) and LSI software kit. Update firmware, install rated capacity charts or export data logger files using the portable download tool without removing the display from the crane. The PDA and the GS550 display connect wirelessly through the IrDA (infrared) ports and the PDA and a personal computer (PC) can be connected with a USB cable.

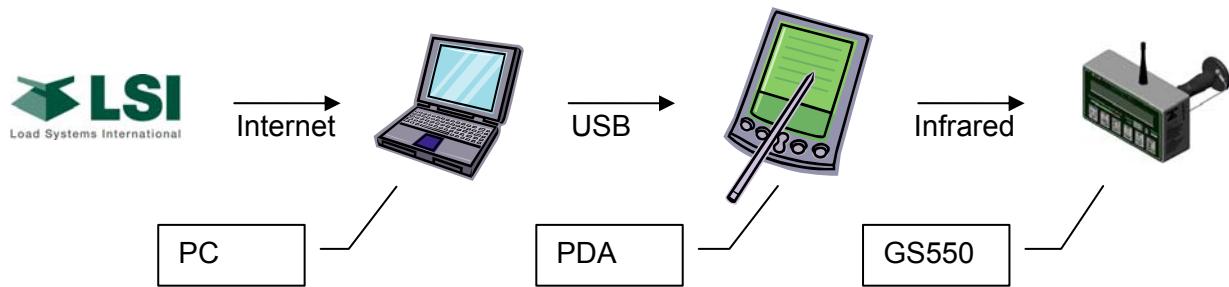


Figure: Transfer firmware updates and rated capacity charts to the GS550

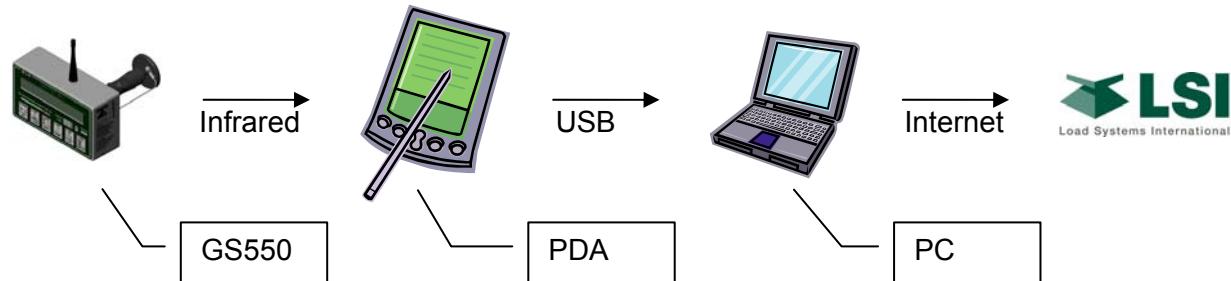


Figure: Transfer data logger files from the GS550

Important! The PDA must be charged to function.

The purpose of this section is to explain:

- How to install PDA software on a PC.
- How to update a GS550 firmware
 - Transfer files from a PC to the PDA.
 - Transfer files from the PDA to a GS550.
 - Conserve GS550 configuration when updating firmware
- How to extract a data logger file from the GS550
 - Transfer files from a GS550 to the PDA.
 - Transfer files from the PDA to a PC.



Figure: Transferring files from a Palm to a GS550

Installing PDA Software

Insert the CD-ROM identified Desktop Software & manual in the personal computer (PC) CD-ROM drive; installation will begin automatically. This software is also available on the internet at Palm's web site:

http://www.PalmOne.com/us/support/downloads/win_desktop.html

The software should be installed in the default directory:

C:\Program Files\Palm

Follow the installation wizard step by step.

When asked to create a new account, click Yes, but leave the name field blank. The installation wizard will automatically create a folder with the name of the PDA.

When prompted to reboot the PC click Yes.

In Windows Explorer go to

C:\Program Files\PalmOne and start HotSync.exe

A small icon will appear in the Windows tray bar to indicate that HotSync is installed on your PC; this software is used to establish communication and synchronize data between the PDA and the PC.

Transferring Files

Transfer Firmware Files from a Personal Computer to the PDA

Two types of files can be sent to the PDA:

- LSI files identified by the filename extension .pdb, including firmware, rated capacity charts and system configuration updates for the GS550.
- LSI files identified by the filename extension .prc, including firmware and data logger software for the PDA.
 1. Connect the PDA to a USB port on the personal computer (PC) using the supplied cable.
 2. In Windows Explorer: double click (or right click) on required file names with the .pdb or .prc extensions; Windows will automatically start a PalmOne list of files that will be sent to the PDA the next time the PDA is synchronized.
 3. On the PDA: press the star icon to start HotSync. Once started HotSync will connect the PDA with the PC and update files from each.

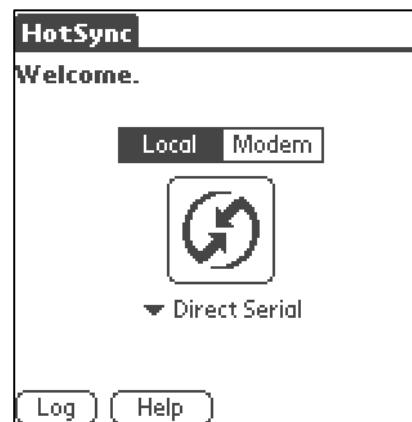


Figure: The Palm HotSync page

Transfer Firmware Files from the PDA to a GS550

1. On the PDA, start the LSI Firmware software:
 - a. Press the house icon to go to the Home menu.
 - b. Select the LSI Firmware icon from the Home menu.

2. On the GS550 display, press and hold **Bypass** while starting the display. The display will enter a safer mode and allow firmware updates.
3. Align the infrared ports of the PDA and the GS550, about 6 inches (10 centimetres) apart.
4. On the PDA, send the file:
 - a. Select a firmware or chart file to send from the LSI Firmware file list.
 - b. Press Send. The GS550 will display **Transferring**

When the transfer is complete the PDA generates a short musical alarm and the GS550 displays the version identification of the newly installed GS550 firmware.
5. Repeat steps two through four to transfer any additional files.

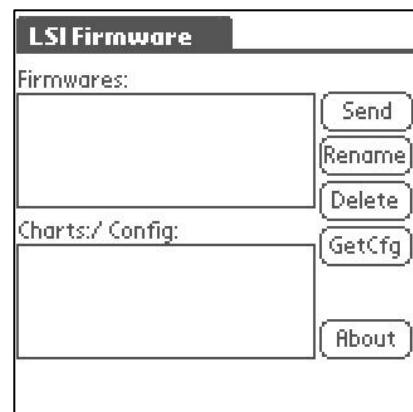


Figure: The Palm LSI firmware list

Tip: For advanced users only. To conserve the GS550 configuration during a firmware update read the section that follows

Conserve GS550 Configuration When Updating Firmware

The LSI Firmware PDA Software can conserve the actual (old) system configuration, including the sensor list and radius parameters, when updating firmware in a GS550 display. When this option is selected the PDA retrieves the configuration from the GS550 and saves it before sending the new firmware. If a problem occurs during the firmware update, then the saved configuration file will be displayed in the LSI Firmware Charts/Config list on the PDA. The configuration can then be returned to the GS550 by following the instructions “Transfer Firmware Files from the PDA to a GS550”

1. On the PDA, start the LSI Firmware software:
 - a. Press the house icon to go to the Home menu.
 - b. Select All from the drop down menu in the upper right hand corner.
 - c. Select LSI Firmware.
2. Correctly align the infrared ports of the PDA and the GS550.
3. On the PDA, press GetCfg. The GS550 will display **Transferring**

When the transfer is complete the PDA generates a short musical alarm and a file with the name

CONFIG#

is added to the Charts/Config list.

Transfer Data Logger Files from the GS550 to the PDA

1. On the PDA, start the LSI Datalogger software.
 - a. Press the house icon to go to the Home menu
 - b. Select All from the drop down menu in the upper right hand corner
 - c. Select LSI Datalogger.

2. Align the infrared ports of the PDA and the GS550 about 6 inches (10 centimetres) apart.
3. On the PDA, receive the file:
 - a. Press Receive.
 - b. Select Complete to transfer the entire data logger memory, or select From Last to transfer only data logged since the last download. The GS550 will display **Transferring**

When the transfer is complete the PDA generates a short musical alarm and displays the uploaded file name in the LSI Datalogger file list.

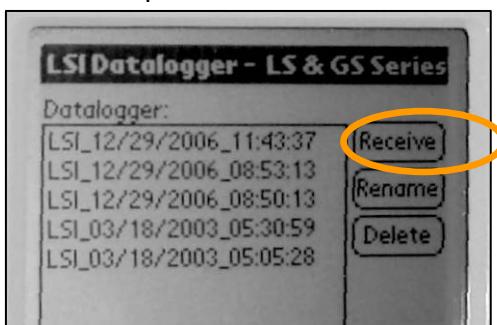


Figure: The Palm LSI Datalogger file list



Figure: The Palm LSI Datalogger options

Transfer Data Logger Files from the PDA to a Personal Computer

1. Connect the PDA to a personal computer (PC) using the PDA -USB cable.
2. On the PDA, press the star icon to start HotSync. HotSync will connect the PDA with the PC and update files from each. Data logger files will be transferred to the following directory of the personal computer:

C:\Program Files\Palm\PALM_NAME\Backup

Note: PALM_NAME is the actual name of the PDA device.

Trouble Shooting PDA Communication Issues

Copy to a PDA when using several PDAs with the same PC

1. Transfer a firmware to a PDA

- Click on the mouse right-button over the file in an Explorer window. Then select "Send To" ... and "PDA Quick Install". See the picture below.
- Or... double-click on the firmware received in an email.

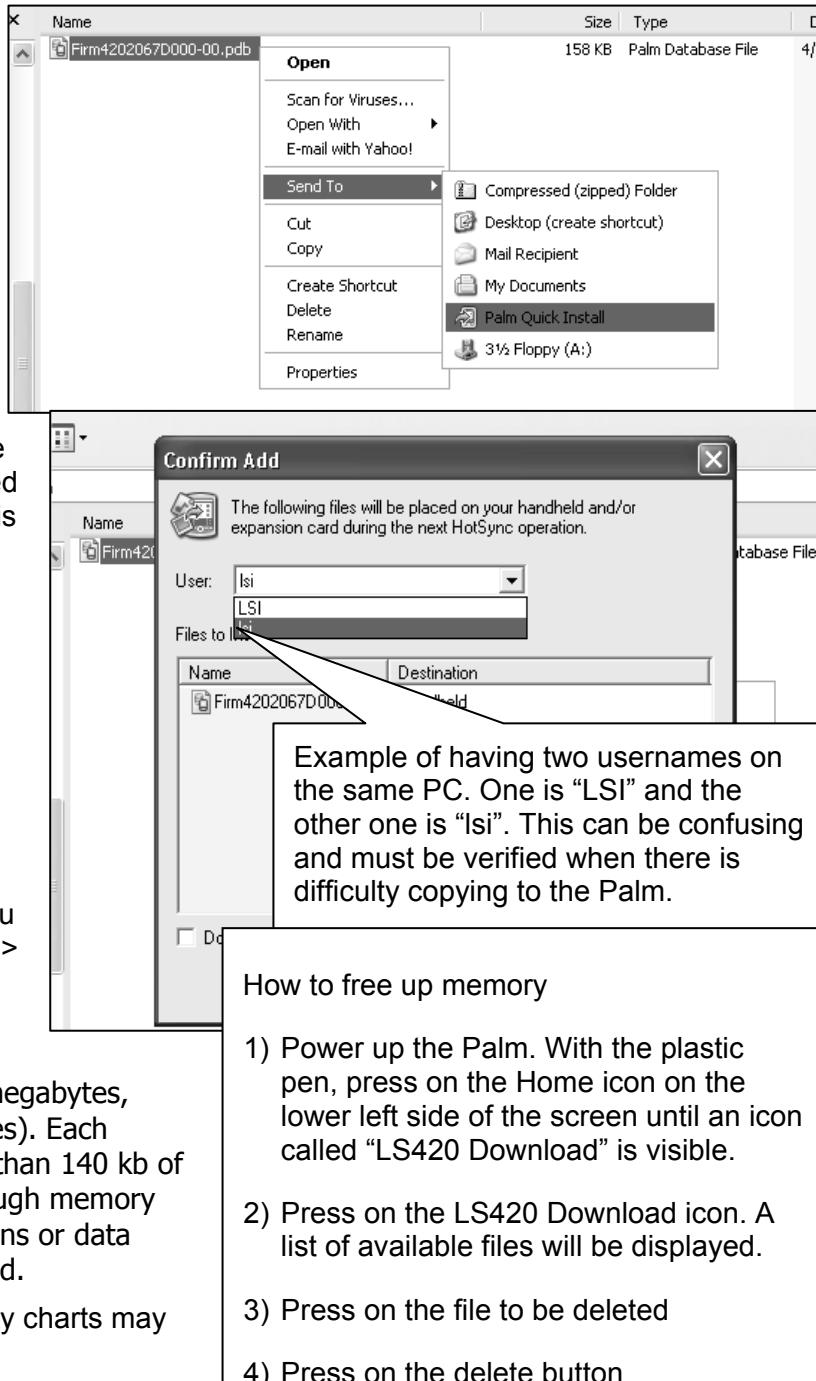
2. Usually a window will pop up to confirm the addition of this file to the list of files to be transferred to a PDA. Verify the "User" in this window. Two or more "users" may be configured to the PC.

Verify PDA memory.

- Power up the PDA. With the plastic pen, press on the Home icon on the lower left side of the screen to see the time of day on the upper left.
- Press on the time of day, a menu should pop up, press on <Info...> in this menu. A page will show how much free memory is available on the PDA.

Example: 1.1M means 1.1 megabytes, equates to 1100 kb (kilobytes). Each GS550 firmware uses more than 140 kb of memory. If there is not enough memory left, verify if some applications or data logger files could be removed.

Note: A firmware with crane capacity charts may require more memory.

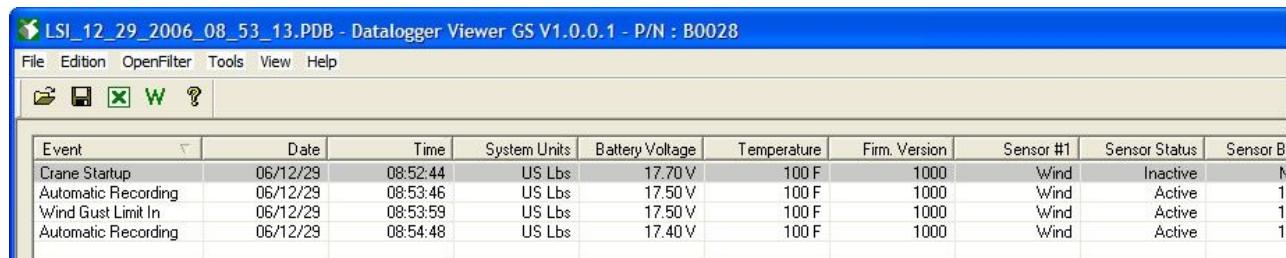


The PDA doesn't respond. If the PDA doesn't appear to respond to commands or if problems occur during a transfer operation then the PDA can be reset by pressing the reset button on the back. All applications will then restart; data should not be lost.

Data Logger Viewer

The Data logger viewer is a software application used to display on a personal computer (PC) a log file generated by the GS550 data logger. To transfer data logger files from a GS550 to a PC see the section “Transferring Files”.

The Data logger viewer opens the log file, converts it from a PDA database file to a text (binary) file, and then displays the contents. Two reports can be produced and transferred to Excel, the full report and the wind speed report*.



Event	Date	Time	System Units	Battery Voltage	Temperature	Firm. Version	Sensor #1	Sensor Status	Sensor B
Crane Startup	06/12/29	08:52:44	US Lbs	17.70 V	100 F	1000	Wind	Inactive	N
Automatic Recording	06/12/29	08:53:46	US Lbs	17.50 V	100 F	1000	Wind	Active	10
Wind Gust Limit In	06/12/29	08:53:59	US Lbs	17.50 V	100 F	1000	Wind	Active	10
Automatic Recording	06/12/29	08:54:48	US Lbs	17.40 V	100 F	1000	Wind	Active	10

Figure: Excerpt of a full report in Data Logger Viewer

Installation on a Personal Computer

Install the CD in a CD-ROM drive. The interactive installation process should start automatically within 30 seconds; if not then:

1. Click Start.
2. Click My Computer.
3. Double-click on the CD-ROM drive.
4. Double-click on setup.exe.
5. Complete the installation as instructed on screen.

Quick Start

1. Select the Data logger viewer application from the Start menu of the personal computer.

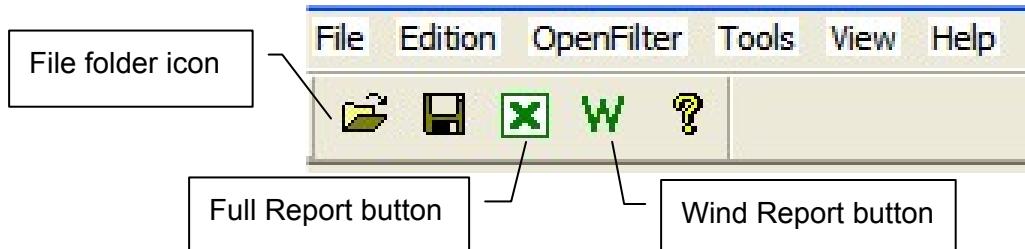


Figure: Data Logger Viewer tool bar

2. Click on the file folder icon to open a log file (or click on File → Open).
3. Enter the file location.

Example: A typical PDA file folder

C:\Program Files\PDA\PDA_NAME\Backup\

* The wind report is only available when the data logger has recorded in the *automatic recording* mode.

Note: PDA_NAME is the actual name given to the PDA.

4. Select the log file to open. Only .pdb files generated by the LSI software in the Portable Download Tool are supported.

Example: A typical file name for a log file generated by a GS550 data logger

LSI_08_13_2004_15_31_48.PDB

Full Report

To export the full report to Excel, click on the Full Report button in the tool bar.

Table: Full report column headings

<u>Column</u>	<u>Description</u>
Event	Record trigger*
Date	Event date stamp.
Time	Event time stamp.
System Units	Length units (metric or US) and weight units at the time of the event
Battery Voltage	Display power supply voltage at the time of the event.
Temperature	Internal temperature of the display
Firm. Version	Display firmware version at the time of the event
Sensor # 1	Sensor type: the sensor number corresponds to the sensor list programmed in the GS550
Sensor Status	Sensor was active or inactive at the time of the event.
Sensor Battery	Sensor battery level
Value	Sensor value

* Examples: Crane start-up, sensor alarm. The beginning and end of sensor alarms are indicated as "in" and "out": examples: "overload in", "overload out".

Wind Report

Important! The wind report is only available when the data has been recorded with the data logger in the automatic recording mode.

To create a wind report in Excel, click on the Wind Report button in the tool bar.

	A	B	C	D	E	F
1	Date	Time	Sensor ID	Wind (mph)	Nb.Gust	Max.Gust (mph)
2	2006-12-28	17:17:41	10033	0	0	0
3	2006-12-28	17:18:42	10033	0	0	0
4	2006-12-28	17:19:43	10033	0	0	0
5	2006-12-28	17:20:44	10033	5	0	8
6	2006-12-28	17:21:45	10033	6	0	10
7	2006-12-28	17:22:46	10033	8	0	14
8	2006-12-28	17:23:47	10033	12	0	16
9	2006-12-28	17:24:49	10033	22	1	30
10	2006-12-28	17:25:50	10033	13	0	15
11	2006-12-28	17:26:51	10033	9	0	12
12	2006-12-28	17:27:52	10033	9	0	16
13	2006-12-28	17:29:03	10033	8	0	18
14	2006-12-28	17:29:54	10033	8	0	12
15	2006-12-28	17:30:55	10033	7	0	10
16	2006-12-28	17:31:56	10033	7	0	11

Figure: Excerpt of a Wind Report

Table: Wind report column headings

<u>Column</u>	<u>Description</u>
Date	Date of event recorded
Time	Time of event recorded
Sensor ID	Wind speed sensor id number
Wind (mph)	Average wind speed during the period
Nb. Gust	Number of gusts exceeding the wind speed maximum limit during the period.
Max. Gust (mph)	Maximum wind speed (gust) during the period.

Wind charts. The data from the Wind or Max Gust columns can be easily charted.

1. Press Control and select the time column and either the Wind or the Max Gust column.
2. Click Insert → Chart
3. Select X-Y (Scatter)

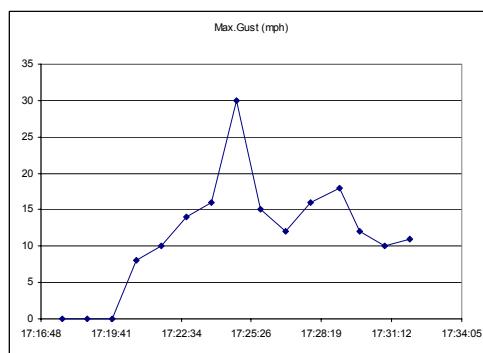


Figure: Max. Gust Chart

Maintenance

Replacing Sensor Batteries

This procedure does not apply to the GS050 anti-two-block switch. To change the batteries of the GS050 please refer to the Replacing Anti-Two-Block Switch Batteries section of this manual.

The following items are required:

- A hex key 5/32 in. (approximately 3.97 mm)
- A flat bladed screwdriver
- One (1) new high quality "D" cell battery: 3.6 V lithium, or alkaline
- RTV non-corrosive silicone

*Tip: A 3.6 volt lithium "D" cell battery will provide about two years of battery life for a load cell, while an alkaline "D" cell battery will provide less than one year of battery life.**

Important! Protect the interior of the anti-two-block switch from dirt and humidity at all times.

1. Unscrew the two hex screws about a quarter of an inch.
2. Insert the flat bladed screwdriver in the battery cover notch to pry the box away from the mounting plate. The silicone seal may cause some resistance.
3. The link wires of a load cell may be disconnected to facilitate battery replacement.
4. Remove the battery by hand
5. Remove the remaining silicone from both the box and the mounting plate.
6. Install the new battery: insert the positive end and then push in the direction of the positive pole.
7. Reconnect the link wires if disconnected.
8. Apply the non-corrosive RTV silicone all around the edge of the mounting plate to create a new seal without bubbles or breaks.
9. Reposition the box over the mounting plate and screw in the hex screws. Do not over-tighten.



Figures: Removing the battery

* Actual battery life will vary greatly depending on the application, the frequency of use, the age and quality of the battery etc.

Replacing Anti-Two-Block Switch Batteries

This procedure does not apply to the GS005 mechanical anti-two-block transmitter. To change the batteries of the GS005 please refer to the Replacing Sensor Batteries section of this manual.

The following items are required:

- An adjustable wrench
- Four (4) new high quality "C" cell batteries: 3.6 V lithium, or alkaline
- RTV non-corrosive silicone

*Tip: Four 3.6 volt lithium "C" cell batteries will provide over four years of battery life, while four alkaline "C" cell batteries will provide about one year of battery life.**

Important! Replace all four batteries of the anti-two-block switch at the same time. Unchanged batteries will reverse polarity severely reducing battery life.

Important! Protect the interior of the anti-two-block switch from dirt and humidity at all times.

1. Remove the anti-two-block from the crane and clean off dust and grime.

Important! Do not unscrew the white nylon hex bolt of the antenna.

Important! Do not unscrew the small screw to the left of the antenna.

2. Place the anti-two-block on the edge of flat surface. Use the adjustable wrench to unscrew the large white nylon hex bolt of the wire rope about one half-inch.
3. Carefully remove the plunger assembly without separating it from the cover, and place it on a clean and dry surface.
4. Slide out the four batteries.
5. Insert the four new batteries following the positive – negative schema printed on the back of the sensor.
6. Replace the plunger assembly. Correctly align the bottom cover before screwing in the white nylon hex bolt of the wire rope. Tighten well.
7. Pull and release the wire rope, the light emitting diode (LED) on the bottom of the sensor should flash red.
8. Reinstall the anti-two-block switch.
9. Test the anti-two-block system for alarm and lockout before use.



Figures: Changing GS050 batteries

* Actual battery life will vary greatly depending on the application, the frequency of use, the age and quality of the batteries etc.

Replacing a Sensor Antenna

The GS series sensor antenna (part number TA011) is identified by a blue coated tip. The TA011 is replaceable.



Figure: TA011 GS series sensor antenna

Heavily damaged antennas (ripped out, sheared off, wire exposed and fraying etc.) should be replaced to ensure communication between the sensor and the cabin mounted display unit.

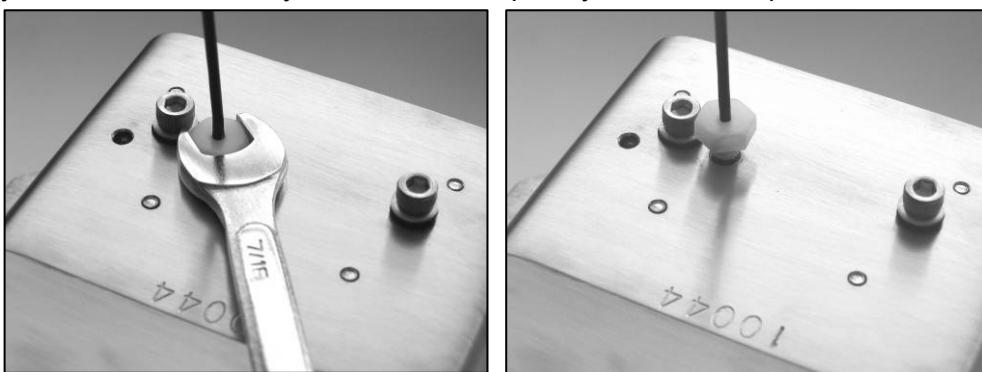
The following items are necessary to successfully replace the sensor antenna:

- one new antenna with white nylon hex bolt
- one wrench 7/16 inch
- an electrical insulating compound

This procedure may be followed without removing the sensor from the crane if it is safe to do so. If removed, an angle sensor must be re-calibrated during reinstallation for correct angle display (see the angle sensor installation section of the user manual).

Important! The interior of the sensor must be protected from dust, grime and water at all times. If it rains during the procedure an umbrella or other suitable means of protection should be used.

1. Place the crane, boom, jib or ball hook such that the sensor is safely accessible.
2. Clean dust, grime and water from the sensor.
3. Identify the short black whip antenna and the white hex bolt securing it.
4. Inspect the antenna for signs of obvious physical damage.
5. Carefully unscrew the white nylon hex bolt completely and slide it up the antenna.



Pictures: Removing the antenna

6. Grip the antenna by the base of the black plastic sheathing and pull it straight out of the hole in which it is seated. Place the old antenna aside.
7. Slide the white nylon hex bolt to the middle of the length of the new antenna.
8. Coat the exposed metal foot of the new antenna with an electrical insulating compound by carefully inserting it in the mouth of the compound tube.



Picture: Coating the antenna foot

9. Hold the new antenna by the black plastic sheathing and guide it through the hole in the sensor box. Carefully seat the antenna in its mating connector. When the antenna is correctly seated, pulling on it will be met with light resistance.

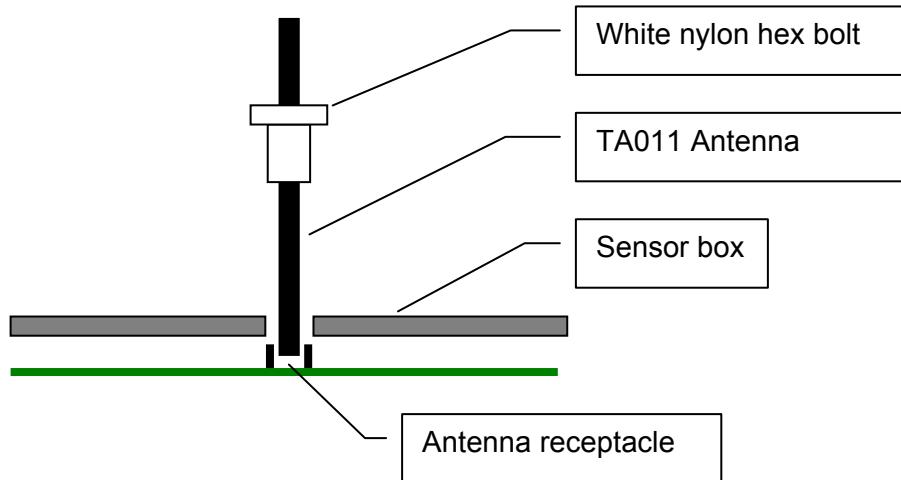


Figure: Seating the antenna

10. Carefully re-thread, screw-in and tighten the white nylon hex bolt to secure the antenna in place.
11. Reinstall the sensor if necessary (if removed from the boom or jib, an angle sensor will require re-calibration during the installation procedure, see the angle sensor installation section of the user manual).
12. Verify that the sensor functions properly.

Load Cells

WARNING! Heavy shock may affect load indication accuracy. Inspect the load cell regularly for clearly visible dents or scratches. Test the load indication if collision damage is visible.

Reading Accuracy

LSI flat bar load links are pre-calibrated at the factory. No “zeroing” or other calibration is required on installation. Each link is heat treated to age the steel and ensure stable readings for many years; the load cells are individually temperature compensated to guarantee accuracy. LSI flat bar load links are calibrated to indicate between 100% and 104% of their Safe Working Load (SWL).

LSI load pins, line riders and compression cells must be calibrated at installation and every time thereafter the installation, the load sensor or the transmitter is changed.

SAE J-159 4.2.1 recommends load indicating devices should show not less than 100% of the actual load and not more than 110% of the actual load.

Load Testing

LSI recommends testing the load cell every year for accuracy. The simplest way of testing a load cell is to lift at least two known weights. A test weight should be known with an accuracy of $\pm 1\%$. If the load cell is installed at the boom tip dead end, all additional equipment such as blocks, slings, sensors, etc. should also be known to an accuracy of $\pm 1\%$.

Determine the accuracy of the tested system with the following formula:

$$\frac{\text{Indicated Load}}{\text{Actual Load}} \times 100 = \% \text{ of Load}$$

(Reference: SAE-J-159 7.3)

The test loads must be significant relative to the load cell capacity. The minimum test weight is about 20% of the safe working load; a good test weight is greater than 50% of the SWL. For example, a 30 000 lb load cell on four parts of line has a SWL of 120 000 lb; the minimum test load in this case would be 24 000 lb, a good test load would be 60 000 lb or more.

Care

Battery. Lithium batteries over than 18 months old (alkaline batteries over 6 months old) should be changed at the first available planned inspection even if there is not yet a low battery warning. This will avoid costly delays in the field.

Corrosion. Verify that no corrosion is visible on the battery holder inside the load cell transmitter. If some trace of corrosion is visible, rub it off gently and put a small amount of dielectric grease* on each battery holder post to protect the contact.

Mechanical stresses. Verify the load cell sides for dents or heavy scratches. The side of the load cell under the transmitter box is the most sensitive region. Engraving a number in this area will affect load cell accuracy and reliability. If the transmitter box has been hit and the box does not fit perfectly to the underlying link, please call LSI to have it repaired. Engraving on the transmitter box sides will not affect reading.

Seal. If the transmitter box has been removed it must be correctly resealed with RTV non-corrosive silicone.

Antenna. Small scratches on the antenna will not affect radio communications. A heavy bending of the antenna or bare sections on the wire may reduce the radio efficiency.

Hex bolts. The hex head bolts on the transmitter box are there to protect the antenna and to hold the transmitter box on the load cell link. If one or both hex nuts are scratched, it will not affect the load cell readings on operation. If the bolt head is bent or sheared verify the transmitter box fits tightly to the load cell link before contacting LSI for replacement bolts.

* Dow Corning dielectric grease #4

Certification Notes

Model Numbers

The model numbers for product certified by the Federal Communications Commission (FCC – United States of America), Industry Canada (IC), and the European Community (CE) can be found in the table below.

Table: Model Numbers

<u>FCC and IC Certified</u>	<u>CE Certified</u>
GC005	GC005-CE
GC012	GC012-CE
GC018	GC018-CE
GC035	GC035-CE
GC060	GC060-CE
GC065	GC065-CE
GC100	GC100-CE
GC170	GC170-CE
GS001	GS001-CE
GS002	GS002-CE
GS005	GS005-CE
GS010-01	GS010-01-CE
GS010-02	GS010-02-CE
GS010-03	GS010-03-CE
GS011	GS011-CE
GS020	GS020-CE
GS050	GS050-CE
GS550	GS550-CE
GS550-03	
GS550-07	GS550-07-CE
GS550-08	GS550-08-CE
GS550-09	GS550-09-CE
GS550-10	GS550-10-CE



CSA

The designator “CSA” added to the model numbers in the table above indicates CSA certification.
Examples: GC012-CSA, GC012-CSA-CE

FCC and IC – Instructions to the User

This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

In order to maintain compliance with FCC regulations, shielded cables must be used with this equipment. Operation with non-approved equipment or unshielded cables is likely to result in interference to radio and TV reception. The user is cautioned that changes and modifications made to the equipment without the approval of manufacturer could void the user's authority to operate this equipment.

FCC ID: QVBGS550

IC: 7076A-ICGS550

RF Exposure Warning:

This product complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment. To comply with RF exposure requirements, the unit must be installed and operated with 20 cm (8 in.) or more between the product and your body. This product may not be collocated or operated in conjunction with any other antenna or transmitter.

This device has been designed to operate with the antennas listed below, and having a maximum gain of 2.0 dB. Antennas not included in this list or having a gain greater than 2.0 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

Antenna List

LSI P/N:	TA001	LSI P/N:	TA008
Description	1/4 wave monopole	Description	1/2 wave dipole
MFG	Linx Technologies	MFG:	Nearson
P/N	ANT-916-CW-QW	P/N:	S467AH-915S

FCC ID: QVBGS000

IC: 7076A-ICGS000

RF Exposure Warning:

This product complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment. To comply with RF exposure requirements, the unit must be installed and operated with 20 cm (8 in.) or more between the product and your body. This product may not be collocated or operated in conjunction with any other antenna or transmitter.

This device has been designed to operate with the antennas listed below, and having a maximum gain of 3.0 dB. Antennas not included in this list or having a gain greater than 3.0 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

Antenna List

LSI P/N: TA011
Description ¼ wave monopole
MFG Load Systems International

FCC ID: QVBGS050

IC: 7076A-ICGS050

RF Exposure Warning:

This product complies with FCC/IC radiation exposure limits set forth for an uncontrolled environment. To comply with RF exposure requirements, the unit must be installed and operated with 20 cm (8 inches) or more between the product and your body. This product may not be collocated or operated in conjunction with any other antenna or transmitter.

This device has been designed to operate with the antennas listed below, and having a maximum gain of 3.0 dB. Antennas not included in this list or having a gain greater than 3.0 dB are strictly prohibited for use with this device. The required antenna impedance is 50 ohms.

To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that permitted for successful communication.

Antenna List

LSI P/N: TA011
Description ¼ wave monopole
MFG Load Systems International

Notes for CSA Class I, Division 1 and 2 Rated Equipment

WARNING: Understand manual before operation.

WARNING: Replace batteries only in area known to be non-hazardous.

In all sensors except the GS050-CSA, use 3.6V lithium batteries model Tadiran TL-5930

In GS050-CSA anti-two-block switches, use only alkaline 'C' batteries model Duracell 1.5 volts PC1400.

WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.

WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2.

WARNING: DO NOT remove power cable from display when on.

For sensors: use "T4" temperature code.

CE – Declaration of Conformity



Load Systems International

LOAD SYSTEMS INTERNATIONAL INC.

Declaration of Conformity According to EN 45014

Manufacturer's Name: Load Systems International Inc.

Manufacturer's Address:

Canada:
4495 boul. Wilfrid-Hamel, bur. 110
Québec QC G1P 2J7

United States of America:
9223 Solon Rd, Suite A
Houston TX 77064

United Arab Emirates:
Y02 Saif Zone, P.O. Box 7976
Sharjah

declare under our own responsibility that the products:

<u>Model</u>	<u>Description</u>
GC005-CE	5 000 lb capacity load cell for Europe
GC012-CE	12 000 lb capacity load cell for Europe
GC018-CE	18 000 lb capacity load cell for Europe
GC035-CE	35 000 lb capacity load cell for Europe
GC060-CE	60 000 lb capacity load cell for Europe
GC065-CE	65 000 lb capacity load cell for Europe
GC100-CE	100 000 lb capacity load cell for Europe
GC170-CE	170 000 lb capacity load cell for Europe
GS001-CE	Load Transmitter With Pigtail 6 in. for Europe
GS002-CE	Load Transmitter w/pigtail & pull up for 0mv balanced cell for Europe
GS005-CE	Anti-Two-Block Transmitter for Europe
GS010-01-CE	Boom Angle sensor for Europe
GS010-02-CE	360° Angle sensor for Europe
GS010-03-CE	List Angle sensor for Europe
GS011-CE	Angle sensor with Length input for Europe
GS020-CE	Wind Speed sensor for Europe
GS050-CE	Anti-Two-Block sensor for Europe
GS550-CE	Standard GS display for Europe
GS550-07-CE	GS550 Display Spanish for Europe
GS550-08-CE	GS550 Display for Manitowoc for Europe
GS550-09-CE	GS550 Display for Shuttlelift for Europe
GS550-10-CE	GS550 Display Spanish for Shuttlelift for Europe

to which this declaration refers conform to the relevant standards or other standardising documents:

Wireless: EN 300 220-3 V1.1.1 (2000-09)
EMC: EN 301 489-3 V1.4.1 (2002-08)

Québec, June 26th, 2007

Dave Smith
President

GS550 Menu Outline

- 1) Parts of Line
- 2) Crane Rigging
- 3) Display Settings
 - 3A) Weight units
 - 3B) Display language
 - 3C) Light intensity
 - 3D) LCD contrast
 - 3E) Backlight mode
- 4) Installation
 - 4A) Sensor List
 - 4A1) Sensor type and radio identification number
 - 4A2) System selected configuration number
 - 4A3) Configuration number selection mode
 - 4B) Sensor Calibration
 - 4B1) Automatic value calibration wizard
 - 4B2) Manual parameter calibration
 - 4B3) Reset sensor parameters
 - 4C) Radius Settings
 - 4C1) Boom length
 - 4C2) Slew offset
 - 4C3) Height offset
 - 4C4) Boom deflection
 - 4C5) Boom top length
 - 4C6) Boom top offset
 - 4C7) No load deflection
 - 4C8) Jib offset
 - 4C9) Lattice extension offset
 - 4C10) Jib mounting point perpendicular
 - 4C11) Jib mounting point parallel
 - 4C12) Select sheave
 - 4C13) Jib length
 - 4C14) Luffing jib length
 - 4C15) Lattice extension length
 - 4C16) Manual length
 - 4C17) Sheave head length perpendicular
 - 4C18) Sheave head length parallel
 - 4C19) Sheave radius
 - 4C20) Deduct
 - 4D) Chart Settings
 - 4D1) Operation mode
 - 4D2) Crane capacity chart interpolation
 - 4D3) Out of charts default working load limit
 - 4D4) Enable start section
 - 4D5) Enable stop section
 - 4D6) Retracted boom length tolerance
 - 4D7) Intermediate boom length tolerance
 - 4D8) Extended boom length tolerance
 - 4D9) Radius tolerance
 - 4D10) Boom angle tolerance
- 4E) Memory Banks
 - 4E1) Copy configuration to memory bank A
 - 4E2) Copy configuration to memory bank B
 - 4E3) Copy configuration to memory bank C
 - 4E4) Copy memory bank A to current configuration
 - 4E5) Copy memory bank B to current configuration
 - 4E6) Copy memory bank C to current configuration
 - 4E7) Restore factory configuration
 - 4E8) Clear configuration
- 4F) Data Logger
 - 4F1) Data logger mode
 - 4F2) Adjust date
 - 4F3) Adjust time
- 4G) Lockout Settings
 - 4G1) Warning level
 - 4G2) Alarm level
 - 4G3) Lockout level
 - 4G4) White wire lockout trigger
 - 4G5) Green wire lockout trigger
 - 4G6) Orange wire lockout trigger
 - 4G7) Blue wire lockout trigger
 - 4G8) Lockout relay inverted
- 4H) Password Settings
 - 4H1) Set administrator password
 - 4H2) Set user password
 - 4H3) Tare menu password protection
 - 4H4) Limit menu password protection
 - 4H5) Info menu password protection
 - 4H6) System start-up password protection
 - 4H7) Parts of Line menu password protection
 - 4H8) Chart Rigging password protection
 - 4H9) Display Settings password protection
 - 4H10) Sensor List password protection
 - 4H11) Sensor Calibration password protection
 - 4H12) Radius Settings password protection
 - 4H13) Chart Settings password protection
 - 4H14) Memory Banks password protection
 - 4H15) Data logger password protection
 - 4H16) Lockout Settings password protection
 - 4H17) Network Options password protection

4H18) System Diagnostic password protection

4H19) Alarm Bypassed protection

4I) Network Options

4I1) Display mode

4I2) Set-up sensor repeater

4I3) Last repeater programmed

4I4) Install update

5) System Diagnostic

5A) System Sensors Diagnostic

5B) Radio Network Diagnostic

5B1) Radio network background noise

5B2) List last 32 sensors received

5B3) Search for sensors

5C) Lockout Diagnostic

5C1) White wire status and self-test

5C2) Green wire status and self-test

5C3) Orange wire status and self-test

5D) Display Diagnostic

5D1) Time and date

5D2) Time clock battery test

5D3) External power supply voltage

5D4) Internal temperature

5D5) GS550 base station identification number

5D6) GS550 (portable) battery level

5D7) Radio (certification and frequency)

5E) Digital Input Diagnostic

5E4) Blue wire status

GS550 Menu Locator

A

Adjust date, 4F2
Adjust time, 4F3
Alarm Bypassed protection, 4H19
Alarm level, 4G2
Automatic value calibration wizard, 4B1

Display Settings password protection, 4H9

E

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Enable stop section, 4D5
Extended boom length tolerance, 4D8
External power supply voltage, 5D3

B

Backlight mode, 3E
Blue wire (digital input status), 5E4
Blue wire lockout trigger, 4G7
Boom angle tolerance, 4D10
Boom deflection, 4C4
Boom length, 4C1
Boom top length, 4C5
Boom top offset, 4C6

Green wire status and self-test, 5C2
Green wire lockout trigger, 4G5
GS550 base station identification №, 5D5
GS550 battery level/charging, 5D6

G

Height offset, 4C3

H

Chart Rigging password protection, 4H8
Chart Settings, 4D
Chart Settings password protection, 4H13
Clear configuration – memory banks, 4E8
Configuration number selection mode, 4A3
Copy configuration to memory bank A, 4E1
Copy configuration to memory bank B, 4E2
Copy configuration to memory bank C, 4E3
Copy memory bank A to current configuration, 4E4
Copy memory bank B to current configuration, 4E5
Copy memory bank C to current configuration, 4E6
Crane capacity chart interpolation, 4D2
Crane Rigging, 2

Info menu password protection, 4H5
Install update, 4I4
Installation, 4
Intermediate boom length tolerance, 4D7

I

C

Jib length, 4C13
Jib mounting point parallel, 4C11
Jib mounting point perpendicular, 4C10
Jib offset, 4C8

J

D

Data Logger, 4F
Data logger mode, 4F1
Data logger password protection, 4H15
Deduct, 4C20
Digital Input Diagnostic, 5E
Display Diagnostic, 5D
Display internal temperature, 5D4
Display language, 3B
Display mode, 4I1
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LCD contrast, 3D
Light intensity, 3C
Limit menu password protection, 4H4
List last 32 sensors received, 5B2
Lockout Diagnostic, 5C
Lockout level, 4G3
Lockout relay inverted, 4G8
Lockout Settings, 4G

L

Lockout Settings password protection, 4H16
Luffing jib length, 4C14

Reset sensor parameters, 4B3
Restore factory configuration, 4E7
Retracted boom length tolerance, 4D6

Manual length, 4C16
Manual parameter calibration, 4B2
Memory Banks, 4E
Memory Banks password protection, 4H14

N

Network Options, 4I
Network Options password protection, 4H17
No load deflection, 4C7

O

Operation mode, 4D1
Orange wire status and self-test, 5C3
Orange wire lockout trigger, 4G6
Out of charts default working load limit, 4D3

P

Parts of Line, 1
Parts of Line menu password protection, 4H7
Password Settings, 4H

R

Radio (FCC, IC or CE) and frequency, 5D7
Radio network background noise, 5B1
Radio Network Diagnostic, 5B
Radius Settings, 4C
Radius Settings password protection, 4H12
Radius tolerance, 4D9

Search for sensors, 5B3
Select sheave, 4C12
Sensor Calibration, 4B
Sensor Calibration password protection, 4H11
Sensor List, 4A
Sensor List password protection, 4H10
Sensor type and radio identification number, 4A1
Set administrator password, 4H1
Set user password, 4H2
Set-up sensor repeater, 4I2
Sheave head length parallel, 4C18
Sheave head length perpendicular, 4C17
Sheave radius, 4C19
Slew offset, 4C2
System Diagnostic, 5
System Diagnostic password protection, 4H18
System selected configuration number, 4A2
System Sensors Diagnostic, 5A
System start-up password protection, 4H6

T

Tare menu password protection, 4H3
Time and date, 5D1
Time clock battery test, 5D2

W

Warning level, 4G1
Weight units, 3A
White wire status and self-test, 5C1
White wire lockout trigger, 4G4

LSI PRODUCT WARRANTY

2006/05/26

LIMITED WARRANTY:

LOAD SYSTEMS INTERNATIONAL INC. ("LSI") warrants that its products (the "Products"), for a period of two (2) years after delivery of such Products (the "Warranty Period"), when installed and used in accordance with specifications described in user manuals, technical materials and any related writings published by LSI with respect with such Products, will be free from defects in materials and workmanship. During the Warranty Period, LSI or its designated service representative shall repair, or at its option, replace any Product that is confirmed to be defective by LSI in accordance with the warranty services procedures described below.

WARRANTY SERVICES PROCEDURES

In order to benefit of the above-mentioned warranty, the purchaser shall notify LSI's customer service or LSI's authorized distributor or representative originally responsible for the sale of the Products within the Warranty Period in order to obtain a Return Authorization Number. A proof of purchase of the Product, such as an invoice or a receipt certifying the validity of this warranty, shall be presented in order to obtain warranty services. In any event, even if a Return Authorization Number is provided to purchaser, LSI reserves the right to inspect the damaged Product or part before the final decision of repairing or replacing the defective Product or part.

The defective Product or part shall be returned to LSI or its designated service representative, accompanied by the Return Authorization Number with prepaid shipping charges at the address mentioned below. The purchaser must insure the shipment or accept the risk of loss or damage during the shipment. Purchaser shall also pay any tariff or duty applicable to the return of defective part or Product. LSI will, at its option, repair or replace the Product or part returned to LSI or to its designated service representative. LSI owns all parts removed from a repaired Product. If LSI repairs a Product, its warranty is not extended. If LSI replaces a Product, the replaced Product is warrantied for the remainder of the original term or sixty (60) days, whichever is longer.

LSI will pay transportation costs of replacement or repaired parts to the destination in Canada and the continental United States of America. LSI will not pay any transportation costs of replacement or repaired parts to destination outside of Canada and the continental United States of America which costs shall be for the purchaser's account.

Parts with a Return Authorization Number can be sent to the following location:

From the USA and Mexico:

Receiving Department Tel.: (281) 664-1330 Fax: (281) 664-1390
LSI – U.S. Warehouse
9223 Solon Rd., Ste. A
Houston, TX 77064-1238
United States

From Canada:

EXCLUSION OF OTHER WARRANTIES

The above warranty is the sole warranty applicable and there are no express, legal or implied warranties or conditions in relation to any Products including any implied warranty or condition of merchantability, non-infringement or fitness for a particular purpose and those otherwise arising by statute or otherwise in law or from a course of dealing or usage of trade, which are expressly disclaimed. No oral or written information or advice given by LSI or its employees or representatives shall create a warranty or condition or in any way increase the scope of LSI's obligation. LSI does not warrant that the business results obtained from the use of the Products will be appropriate or adequate for the purchaser.

EXCLUSION

The above-mentioned warranty does not cover and shall not apply to:

- any shipping charges to LSI or an designated service representative as well as the technician out-of-pocket expenses including traveling, lodging and meal expenses, if any;
- the damages caused during the transport or the move of the Products;
- damages caused by accidents, abuse, misuse, a force majeure or external cause;
- Products altered, modified or repaired not expressly authorized by LSI;
- any cost, damage or expenses for field labor or any other expenses related to or arising from the replacement of defective parts.
- **Products used for pile-driving, wire rope activated clamshell or dragline applications. If purchaser uses the Products for pile-driving, wire rope activated clamshell or dragline application, the warranty will automatically become null and void.**

LIMITATION OF LIABILITY

To the maximum extent permitted by applicable law, in no event will LSI be liable to the purchaser or any third party for any indirect, special, consequential, incidental or exemplary damages whatsoever, including but not limited to loss or revenue or profit, lost or damaged data, business interruption or any other pecuniary loss whether based in contract, tort or other causes of action, even if LSI has been advised of the possibility of such damages. In any event, the total liability of LSI arising from any cause of action or claim whatsoever, whether (1) in contract, (2) in tort (including negligence, whether sole, joint, contributory, concurrent or otherwise, but not including intentional, reckless or wanton tort), (3) under strict liability, (4) under any environmental or antipollution law or regulation, (5) connected with any toxic or hazardous substance or constituent, (6) arising out of any representation or instruction, or under any warranty, (7) or otherwise, arising out of, connected with, or resulting from the design, manufacture, sale, resale, delivery, repair, replacement or use of Products or the furnishing of any service shall in no event exceed the price allocable to and paid to LSI for the individual unit of Products or service or part thereof which gives rise to the cause of action or claim.

RECOMMENDED PRACTICE

LSI recommends careful consideration of the following factors when specifying and installing the Products. Before installing a Product, the Installation, Operation, and Maintenance instructions provided with the unit must be read and understood.

LSI Contact Information

USA Corporate Office:

9223 Solon, Suite A
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